

*Stanley Williams*  
**ANSWERS**

**FOR ODD-NUMBERED EXERCISES**

# **Modern School Mathematics**

# **ALGEBRA 2 AND TRIGONOMETRY 2**

**DOLCIANI**

**WOOTON**

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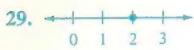
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**Page 5 A** 1.  $\neq$  3. = 5. = 7. = 9.  $\neq$  **B** 11. (1)  $\pi$  is a real number and  $1 + 1 = 2$ . true; (2)  $\pi$  is not a real number or  $1 + 1 \neq 2$ . false; (3)  $\pi$  is a real number or  $1 + 1 = 2$ . true; (4)  $\pi$  is not a real number and  $1 + 1 \neq 2$ . false 13. (1)  $2(1 + 3) \neq 2 + 3$  and  $2(1 + 0) \neq 2 + 0$ . false; (2)  $2(1 + 3) = 2 + 3$  or  $2(1 + 0) = 2 + 0$ . true; (3)  $2(1 + 3) \neq 2 + 3$  or  $2(1 + 0) \neq 2 + 0$ . true; (4)  $2(1 + 3) = 2 + 3$  and  $2(1 + 0) = 2 + 0$ . false 15. (1) The value of  $(15 + 6) \div (9 - 2)$  is 3 and the value of  $(15 + 6) \div (2 - 9)$  is  $-3$ . true; (2) The value of  $(15 + 6) \div (9 - 2)$  is not 3 or the value of  $(15 + 6) \div (2 - 9)$  is not  $-3$ . false; (3) The value of  $(15 + 6) \div (9 - 2)$  is 3 or the value of  $(15 + 6) \div (2 - 9)$  is  $-3$ . true; (4) The value of  $(15 + 6) \div (9 - 2)$  is not 3 and the value of  $(15 + 6) \div (2 - 9)$  is not  $-3$ . false

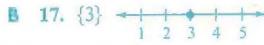


**B** 11.  $-1$  13.  $\notin$  or  $\neq$  15.  $\in$  or  $\neq$  17.  $0$  19. = or  $\subset$  or  $\notin$  21.  $\{-1\}, \{3\}, \{2\}$  23.  $\{-1, 3\}, \{-1, 2\}, \{3, 2\}$  25.  $\emptyset, \{-1\}, \{2\}, \{-1, 3\}, \{-1, 2\}, \{2, 3\}$  27.



33. reading down,  $8 = 2^3$ ,  $16 = 2^4$ ,  $1 = 2^0$

Pages 14–15 **A** 1.  $\{2, 4, 6, 8, \dots\}$  3.  $\{\dots, -4, -2, 0, 2, 4, \dots\}$  5.  $\{\emptyset, \{0\}, \{1\}, \{0, 1\}\}$  7. any real no. except 1 9. 0 or 1 11.  $\{8\}$  13.  $\{\text{all real nos. except } 15\}$



21. For all real

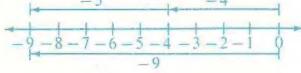
nos.  $b$ ,  $7 \times b = b \times 7$ . 23. For all real nos.  $x$ ,  $(x + 1) + 9 = x + 10$ . 25. For all real nos.  $p$ ,  $1 \times p = p$ . 27. There is a real no.  $a$  such that  $(a + 1)^2 \neq a + 1$ . 29. true 31. true 33. true

**Page 18 A** 1. a. For any three points in space, the points lie on a straight line only if they lie in a plane. b. For any three points in space, if the points lie in a plane, then they lie on a straight line. c. Only the given conditional is true. 3. a. A number is an integer only if it is a real number. b. If a number is a real number, then it is an integer. c. Only the given conditional is true. 5. a.  $x = 6$  and  $y = 3$  only if  $x + y = 9$ . b. If  $x + y = 9$ , then  $x = 6$  and  $y = 3$ . c. Only the given conditional is true. 7. If a real number  $x$  is a root of  $3x + 4 = 10$ , then  $x = 2$ ; and if  $x = 2$ , then  $x$  is a root of  $3x + 4 = 10$ . true 9. For any integer  $a$ , if  $a$  is odd, then  $2a$  is even; and for any integer  $a$ , if  $2a$  is even,  $a$  is odd. false 11. If a triangle is isosceles, then its base angles have the same measure; and if the base angles of a triangle have the same measure, then the triangle is isosceles. true 13. For any non-empty sets  $A$  and  $B$ , if  $A \subset B$ , then  $A$  and  $B$  have at least one element in common; and for any nonempty sets  $A$  and  $B$ , if  $A$  and  $B$  have at least one element in common, then  $A \subset B$ . false **B** 15. definitely false 17. could be either true or false

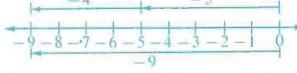
Pages 24–25 **A** 1. a. closed b. closed 3. a. not closed,  $1 + 1 = 2$  is not in the set. b. closed 5. a. closed b. closed 7. a. not closed,  $1 + \frac{1}{2} = 1\frac{1}{2}$  is not in the set. b. closed 9. 90 11. 60 13.  $\{-7\}$  15.  $\{3\}$  17.  $\{-2\}$  19.  $\{\frac{1}{3}\}$  **B** 21.  $\{7\}$  23.  $\{-5\}$  25.  $\{-2\}$  27. a. 8 b. closed c. comm., assoc. 29. a. 15 b. closed c. not comm., not assoc. **C** 31. a. Both operations are assoc. and comm. b. (1)  $\oplus$  is not dist. with respect to  $\otimes$ . (2)  $\otimes$  is dist. with respect to  $\oplus$ .

Page 32 **A** 1.  $-84$  3.  $-67$  5.  $23.87$  7.  $48$  9.  $-13$  11.  $-17$  13.  $-34$  15.  $-4.6$

17. a.



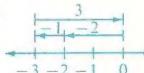
b.



19. a.



b.



Page 37 **A** 1.  $-60$  3.  $-20$  5. 8 7.  $-290$  9.  $-27$  11.  $-9$  13.  $\frac{1}{3}$  15.  $-\frac{1}{7}$

Pages 40–41 Chapter Test 1.  $3 + 7 \neq 10$  3.  $\{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$  5. There is a real number  $x$  such that  $x + 3 = 5$ . 7. If  $2x + 3 = 7$ , then  $x = 2$ ; and if  $x = 2$ , then  $2x + 3 = 7$ . 9. dist. ax. 11. 25 13. 12

## ANSWERS FOR ODD-NUMBERED EXERCISES

**Pages 41–43 Chapter Review** 1. true; false 3. negation 5.  $5 + 7 \neq 12$ ; false 7.  $3 \times 7 = 12$  or  $5 + 7 = 12$ ; true 9.  $3 \times 7 \neq 12$  and  $5 + 7 \neq 12$ ; false 11.  $\{4, 6, 8\}$  13. false 15. false 17. is not 19. replacement 21.  $\emptyset$  23. There is a real number  $t$  such that  $t - 3 = 0$ . 25. conditional; hypothesis or premise; conclusion 27. converse 29. If  $2x + 1 = 15$ , then  $x = 7$ . 31. comm. ax. of add. 33. closure 35. ax. of mult. inv. 37. symm. prop. of  $=$  39. comm. ax. of mult. 41. ax. of one 43.  $a = b$  ax. of add.

45.  $-26$  47.  $-50$  51.  $\frac{1}{pq}$  53.  $-ab$ ;  $-ab$ ;  $ab$  55.  $-4$  57.  $-4$

**Page 46** 1.  $-a$  3. not a group; no identity element and no inverses 5. a group 7. not a group; 0 has no inverse 9. not a group; set not closed and 1 has no inverse 11. not a group; no identity element and not closed 13. b. If  $a, b \in \mathbb{R}$ , then  $(a + b) + (-b) = a$ . If  $a, b \in \mathbb{R}'$ , then  $ab\left(\frac{1}{b}\right) = a$ . 15. b. If  $a, b, x \in \mathbb{R}$ , then  $x + a = b$ , then  $x = b + (-a)$ . If  $a, b, x \in \mathbb{R}'$  and  $xa = b$ , then  $x = b\left(\frac{1}{a}\right)$ . 17. b. If  $a, b \in \mathbb{R}$ , then  $-(a + b) = (-b) + (-a)$ . If  $a, b \in \mathbb{R}'$ , then  $\frac{1}{ab} = \frac{1}{b} \cdot \frac{1}{a}$ . 19. b. If  $a, b \in \mathbb{R}$ , and  $a + b = 0$ , then  $a = -b$ . If  $a, b \in \mathbb{R}'$  and  $ab = 1$ , then  $a = \frac{1}{b}$ . 21. a.  $-$  b.  $\div$

**Page 55 A** 1.  $-370$  3.  $-27.51$  5. 28 7.  $-1$  9.  $1\frac{1}{7}$  11.  $-4\frac{1}{5}$  13.  $-20$  15. no value (division by 0) 17. 3 19.  $-10$  21.  $-2$

**Pages 60–61 A** 1.  $8y^3 + 12y^2 - 6y + 5$  3.  $-3x^5 + x^4 - 2x^2 + 4x - 3$  5.  $2t^5 - 12t^3 + t + 6$  7.  $2y^3 + 2y^2 + 2y + 3$  9.  $-5x^5 + 5x^4 - 4x + 15$  11.  $14t^4 - t + 10$  13.  $x - 9$  15.  $8z - 9$  17.  $-5r - 16$  19.  $5r + 5s$  21.  $4ab + 3a - 3b$  23.  $9x^2 + 11x - 17$  25.  $3a^3 + 8a^2 - 14a + 6$  27.  $n^3 - 2n^2 + n + 2$  29.  $9x^2 - 9x + 9$  31.  $8x^3 + 11x^2 + 2x - 17$  33.  $5b^3 - 3b^2 + b + 5$  35.  $2x^3 + 16x^2y^2 + 10xy^3 - 3x^3y$  37.  $25t + 26s$  **B** 39.  $27a + 22$  41.  $20x^2 - 13x + 12$  43.  $x^3 - 5x^2 + 7x + 1$  45.  $2a^3 + 7a - 4$

**Pages 65–67 A** 1.  $\{4\}$  3.  $\{-8\}$  5.  $\{3\}$  7.  $\{4\}$  9.  $\{35\}$  11.  $\{2\}$  13.  $\{\frac{4}{3}\}$  15.  $\{-3\}$  17.  $\{\frac{1}{2}\}$  19.  $\{1.4\}$  21.  $\{11\frac{1}{3}\}$  23.  $\{169.64\}$  25.  $\{\frac{1}{3}\}$  **B** 27.  $\emptyset$  29.  $\emptyset$  31.  $\{\frac{2}{9}\}$  33.  $\{\frac{1}{2}\}$  35.  $\{-1\}$  37.  $\{\frac{1}{3}\}$

39.  $\emptyset$  **C** 41.  $x = 2b$ ,  $b \neq 0$ ;  $x = 6$  43.  $h = \frac{3V}{\pi r^2}$ ,  $r \neq 0$ ;  $h = 16$  45.  $b = 3A - a - c$ ;  $b = 81$  47.  $a =$

$$\frac{2S}{n} - l, n \neq 0; a = 3$$

**Pages 73–75 A** 1. 5 3.  $-12$  5. width, 8 cm.; length, 16 cm. 7. 22 yr. 9. Machine I, 1370 cans; Machine II, 685 cans; Machine III, 1387 cans 11. 75, 77, 79, 81 13. 3 quarters, 12 dimes 15. 18 cm., 12 cm., 12 cm. 17.  $34^\circ$ ,  $56^\circ$  19. 35 m.p.h., 45 m.p.h. 21. 210 mi. **B** 23. width, 4 cm.; length, 8 cm. 25. 9 in. or  $\frac{9}{4}$  ft. 27. 14 in., 14 in., 34 in. **C** 29.  $5\frac{5}{11}$  min. after 1:00

**Pages 81–82 A** 1.  $\{x: x \leq -1\}$



3.  $\{z: z < -10\}$



5.  $\{a: a \geq 12\}$



7.  $\{m: m < -4\}$



9.  $\{c: c < -5\}$



11.  $\{t: t < 0\}$



13.  $\emptyset$



15.  $\{a: a \geq 1\frac{3}{7}\}$



17.  $\{d: d < 1\}$



19.  $\{p: p \leq 0\}$



**Pages 82–83 A** 1. 220 lb. 3. 8 in. 5. 2 m., 4 m., 4 m.; or 4 m., 5 m., 5 m.; or 6 m., 6 m., 6 m. 7. widow, between \$4,000 and \$6,000; sons, between \$2,000 and \$3,000 9. 12 in. and 48 in. 11.  $\{6, 8, 10, 12\}$ ; {8, 10, 12, 14}

**Pages 87–88 A** 1.  $\{t: t > 4 \text{ or } t < -4\}$



3.  $\{-2, 8\}$



5.  $\{6, -5\frac{1}{3}\}$



7.  $\{u: -8 < u < 4\}$

9.  $\{y: -4 \leq y \leq -3\}$

11.  $\{h: h \leq -2\frac{1}{3} \text{ or } h \geq 1\}$

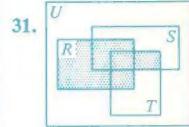
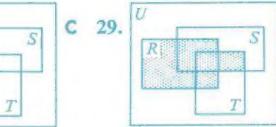
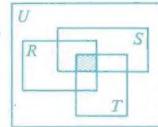
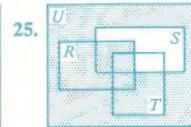
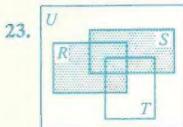
B 13.  $\{t: -6\frac{1}{2} \leq t \leq 3\}$

15.  $\{t: -1 \leq t < 3\}$

17.  $\{x: x \geq 0\}$

19.  $\{g: 0 \leq g \leq 5\}$

21.  $\emptyset$



33.  $B = \{2, 3, 6\}$

Pages 92–93 19.  $(-2)^2 > (1)^2$ , but  $-2 \not> 1$ .

Page 95 Chapter Test 1. 23.6 3.  $x^3 - x$  5.  $\{3\frac{1}{3}\}$  7. 8, 12 9. base has length between 8 in. and 9 in.  
11. a.  $\{-8, -6, -4, -2, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$  b.  $\{2, 4, 6, 8\}$

Pages 95–97 Chapter Review 1. opposite or additive inverse 3.  $-3$  5.  $-8\frac{3}{4}$  7. power or degree; base; exponent 9.  $6y^5 - 2y^3 + 2y + 4$  11. roots or solution sets 13.  $\{1\frac{1}{2}\}$  15.  $r_3 = -\frac{6}{11}$  17. standing, 14 ft.; broken 70 ft. 19.  $<$  21.  $\{x: x < 6\}$

23.  $\{x: x < -\frac{1}{17}\}$

25. greater 27.  $\{-2, 5\}$

29.  $\{z: -3 \leq z \leq 11\}$

31.  $\leq$  33. conclusion 35. all

Pages 97–98 Cumulative Review 1.  $\neq$  3.  $\not\equiv$  (or  $\not\equiv$ ) 5.  $2 + 3 = 5$  and  $4 \times 2 = 7$ ; false 7. For all real numbers  $x$ ,  $x + 2 = 2 + x$ . 9. Each of the statements in Ex. 8 is the converse of the other; both are true. 11. comm. ax. of mult. 13. assoc. ax. of add. 15. comm. ax. of mult. 17. ax. of add. inv. 19.  $-55$  21.  $-4$  23. 1 25. 1 27.  $-a + 3b$  29.  $3p^3 - 3p^2$  31.  $5xy^2 + x^2y + 21$  33.  $\{-2\}$  35.  $\{9\}$  37.  $y = 3$  39. 3 41.  $-1$

43.  $\{x: x < 8\}$

45.  $\{-5, 11\}$

47.

49. 7

Page 101 1. 

$p$	$q$	$p \rightarrow q$
T	T	T

3. 

$p$	$r$	$p \rightarrow r$
T	F	F

9. T 11. T 13. a tautology 15. a tautology

5. 

$p$	$q$	$p'$	$q'$	$p' \vee q'$
T	$\bar{T}$	F	F	F

7. 

$p$	$r$	$p \vee r$	$q$	$(p \vee r) \rightarrow q$
T	F	T	T	T

17. 

$p$	$q$	$p'$	$q'$	$p' \rightarrow q'$	$q \rightarrow p$
T	T	F	F	T	T
T	F	F	T	T	T
F	T	T	F	F	F
F	F	T	T	T	T

Pages 107–108 A 1. 1, 6, 11, 16 3.  $-6, -9, -12, -15$  5. 4, 5.2, 6.4, 7.6 7. 4;  $a_{n+1} = a_n + 1$ ; yes  
9. 2;  $a_{n+1} = 2a_n$ ; no 11.  $\frac{3}{2}$ ;  $a_{n+1} = a_n - 1$ ; yes 13. 1;  $a_{n+1} = (n+1)a_n$  or  $a_{n+1} = (n+1)(n)(n-1)$  ... (1); no 15.  $-2$  17.  $-1.25$  B 19. 1, 1, 2, 3, 5, 8, 13 21. a.  $-6, 3, 12, 21, 30$  b. yes 23. a. 4, 1, 16, 49, 100 b. no 25. a.  $-2k, k, 4k, 7k, 10k$  b. yes C 27.  $x = 9$

Pages 111–112 A 1. 21 3. 78 5. 14 7. 51 9. 27 11.  $-47$  13. 14 15. 9, 2,  $-5$  17.  $-4\frac{2}{7}, -2\frac{2}{3}$ ,

## ANSWERS FOR ODD-NUMBERED EXERCISES

**A** 19.  $-\frac{6}{7}, \frac{6}{7}, 2\frac{2}{3}, 4\frac{2}{7}$     19.  $13\frac{1}{4}, 13\frac{1}{2}, 13\frac{3}{4}, 14, 14\frac{1}{4}, 14\frac{1}{2}, 14\frac{3}{4}$     21. 12, 22, 27    23. 56, 42, 35    25.  $-13, 1, 8, 22$   
**B** 27. 21st    29.  $x = 2\frac{1}{2}$

Pages 112–113 **A** 1. \$10,000    3. \$14    5. 52 words per min.    7. 10%    **B** 9. 60 ft. per sec.    11. 14

Pages 117–118 **A** 1. 258    3.  $-450$     5.  $7\frac{1}{2}$     7. 90    9. 16    11.  $\sum_{i=1}^4 (3i+1)$     13.  $\sum_{i=1}^5 (17-4i)$   
**B** 15. 5050    17. 8, 48, 88    19. 1, 5, 9    21. 3, 7, 11    23. 6,  $6\frac{1}{4}, 6\frac{1}{2}$     25. 13, 8, 3    27. 285    29. 2    31. 3

Pages 118–119 **A** 1. \$145,250    3. 340    5. \$5.10    7. 62    9. 15 months    11. 816    13. after 11 days  
**B** 15. 12,096

Page 123 **A** 1. 1, 3, 9, 27    3.  $\frac{1}{16}, -\frac{1}{4}, 1, -4$     5. 48, 72, 108, 162    7.  $-768$     9.  $-\frac{1}{3125}$     **B** 11. 320  
**C** 13.  $\frac{2}{81}$     15. yes

Pages 123–124 **A** 1. \$10,240    3. 16,807 measures    5. 26,620    **B** 7.  $3\frac{3}{4}$  in.    11. \$1756.92

Pages 128–129 **A** 1. 3    3. 3    5. 5 or  $-5$     7. 2 or  $-2$     9. 9, 81    11.  $-12, -48, -192$  or  $12, -48, 192$   
13.  $\frac{1}{21}, \frac{5}{21}$     15. 6    17.  $-4.2, -8.4, -16.8$     **B** 19.  $n = 5$     21. fifth    23. 64    25. 3    29.  $|2x|$  or  $2|x|$   
31. 10%

Page 131 **A** 1. 42    3. 5    5.  $-52$     7.  $-3\frac{63}{64}$     9. 11.11    11.  $-63$     13.  $13\frac{4}{9}$     15.  $S_n = 1210, a_n = 810$   
17.  $S_n = 484, n = s$     19.  $a_1 = 81, S_n = 195$     21.  $a_1 = 2, a_0 = 512$     23.  $r = -26, a_8 = -1352; r = 25,$   
 $a_3 = -1250$     25.  $n = 4, a_n = -40$     27.  $r = 0.01, n = 3$

Pages 132–133 **A** 1. \$980    3. 510    5.  $1\frac{11}{16}$  pints    7.  $\frac{1}{32}$

<b>Pages 136–137</b> <b>A</b> 1. <table border="1" style="display: inline-table; vertical-align: middle;"> <thead> <tr> <th><math>n</math></th> <th><math>a_n</math></th> <th><math> a_n - L </math></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>0</td> <td>1</td> </tr> <tr> <td>2</td> <td><math>\frac{1}{2}</math></td> <td><math>\frac{1}{2}</math></td> </tr> <tr> <td>3</td> <td><math>\frac{2}{3}</math></td> <td><math>\frac{1}{3}</math></td> </tr> <tr> <td>4</td> <td><math>\frac{3}{4}</math></td> <td><math>\frac{1}{4}</math></td> </tr> </tbody> </table> 5. <table border="1" style="display: inline-table; vertical-align: middle;"> <thead> <tr> <th><math>n</math></th> <th><math>a_n</math></th> <th><math> a_n - L </math></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>3</td> <td>1</td> </tr> <tr> <td>2</td> <td><math>1\frac{1}{2}</math></td> <td><math>\frac{1}{2}</math></td> </tr> <tr> <td>3</td> <td><math>2\frac{1}{3}</math></td> <td><math>\frac{1}{3}</math></td> </tr> <tr> <td>4</td> <td><math>1\frac{7}{8}</math></td> <td><math>\frac{1}{8}</math></td> </tr> </tbody> </table>	$n$	$a_n$	$ a_n - L $	1	0	1	2	$\frac{1}{2}$	$\frac{1}{2}$	3	$\frac{2}{3}$	$\frac{1}{3}$	4	$\frac{3}{4}$	$\frac{1}{4}$	$n$	$a_n$	$ a_n - L $	1	3	1	2	$1\frac{1}{2}$	$\frac{1}{2}$	3	$2\frac{1}{3}$	$\frac{1}{3}$	4	$1\frac{7}{8}$	$\frac{1}{8}$	3. <table border="1" style="display: inline-table; vertical-align: middle;"> <thead> <tr> <th><math>n</math></th> <th><math>a_n</math></th> <th><math> a_n - L </math></th> </tr> </thead> <tbody> <tr> <td>1</td> <td><math>\frac{1}{4}</math></td> <td><math>\frac{1}{4}</math></td> </tr> <tr> <td>2</td> <td><math>\frac{3}{8}</math></td> <td><math>\frac{1}{8}</math></td> </tr> <tr> <td>3</td> <td><math>\frac{7}{16}</math></td> <td><math>\frac{1}{16}</math></td> </tr> <tr> <td>4</td> <td><math>\frac{15}{32}</math></td> <td><math>\frac{1}{32}</math></td> </tr> </tbody> </table> 7. <table border="1" style="display: inline-table; vertical-align: middle;"> <thead> <tr> <th><math>n</math></th> <th><math>a_n</math></th> <th><math> a_n - L </math></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>0.8</td> <td>0.2</td> </tr> <tr> <td>2</td> <td>0.96</td> <td>0.04</td> </tr> <tr> <td>3</td> <td>0.992</td> <td>0.008</td> </tr> <tr> <td>4</td> <td>0.9984</td> <td>0.0016</td> </tr> </tbody> </table> 9. <table border="1" style="display: inline-table; vertical-align: middle;"> <thead> <tr> <th><math>n</math></th> <th><math>a_n</math></th> <th><math> a_n - L </math></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>0.44</td> <td>0.04</td> </tr> <tr> <td>2</td> <td>0.396</td> <td>0.004</td> </tr> <tr> <td>3</td> <td>0.4004</td> <td>0.0004</td> </tr> <tr> <td>4</td> <td>0.39996</td> <td>0.00004</td> </tr> </tbody> </table>	$n$	$a_n$	$ a_n - L $	1	$\frac{1}{4}$	$\frac{1}{4}$	2	$\frac{3}{8}$	$\frac{1}{8}$	3	$\frac{7}{16}$	$\frac{1}{16}$	4	$\frac{15}{32}$	$\frac{1}{32}$	$n$	$a_n$	$ a_n - L $	1	0.8	0.2	2	0.96	0.04	3	0.992	0.008	4	0.9984	0.0016	$n$	$a_n$	$ a_n - L $	1	0.44	0.04	2	0.396	0.004	3	0.4004	0.0004	4	0.39996	0.00004	$(\frac{1}{2})^{n+1}$
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Pages 141–142 **A** 1.  $3\frac{3}{2}$     3. 27    5. divergent    7.  $20\frac{5}{6}$     9. divergent    11. 8    13.  $S = 8$     15.  $r = -\frac{1}{2}$   
17.  $a_1 = 6$     19.  $\frac{5}{9}$     21.  $\frac{4}{33}$     23.  $\frac{25}{37}$     **B** 25.  $\frac{11}{90}$     27.  $3\frac{5}{11}$

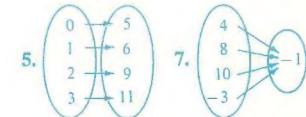
Pages 142–143 **A** 1.  $93\frac{1}{8}$  ft.    3. 200 in.    5. 2 yd.    **C** 7.  $\frac{1+x}{(1-x)^2}$     9.  $\frac{2\sqrt{3}}{5}$  sq. in.

Pages 144–145 Chapter Test 1. 1    3. 9, 15, 21, 27    5. 1820    7. 4 or  $-4$     9. 547    11. 0    13.  $\frac{9}{20}$

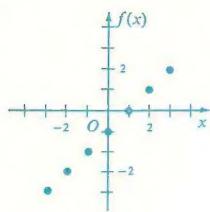
Pages 145–146 Chapter Review 1. sequence or progression    3. 2    5.  $-2, 0, 2$     7.  $(2(1) + 1) + (2(2) + 1) + (2(3) + 1) + (2(4) + 1) + (2(5) + 1) + (2(6) + 1)$     9.  $-192$     11. 7, 11, 15    13. 3, 12,  
48, 192    15.  $r = 2\sqrt{3}$  or  $r = -2\sqrt{3}$     17.  $\frac{3}{32}$     19.  $15\frac{15}{16}$     21.  $(\frac{1}{3})^n$     23. converges    25.  $\frac{7}{33}$

Pages 152–153 **A** 1. 1    3.  $-7$     5. 17    7.  $-69$     9.  $x = -6, y = 5$     11.  $x = \pm 4, y = 4$     13.  
 $\{1, 2, 3, 4\}; s(x) = 5x + 1$     15.  $\{1, 2, 3, 4\}; s(x) = 3(-2)^{x-1}$     17.  $\{(-1, 2), (0, -2), (1, -2), (1, 0)\}$   
19.  $\{(-2, -2), (-1, -2), (0, -2), (0, 0), (1, -2), (1, 0)\}$     **B** 21. 25    23. 7    25.  $2a^2 + 5$     27. a. 4 b. 4  
29. a. a b. a

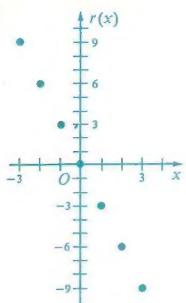
Pages 158–159 **A** 1.  $\{(-1, 0), (2, 3), (3, 4)\}$     3.  $\{(1, 4), (2, 4), (3, 4)\}$



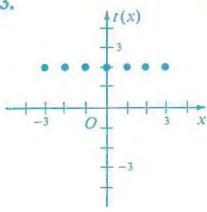
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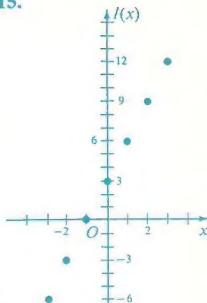
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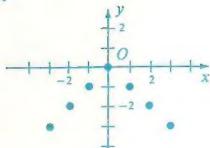
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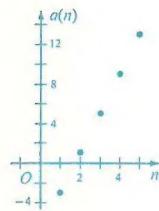
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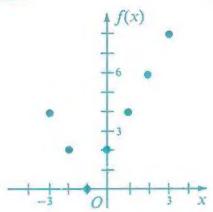
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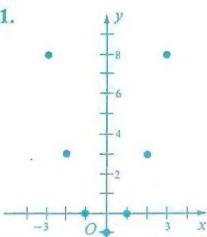
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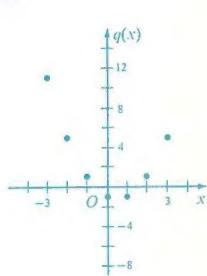
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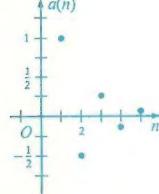
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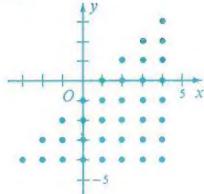
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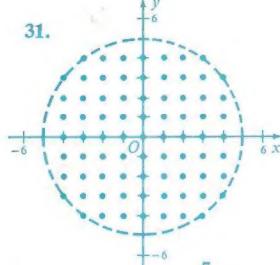
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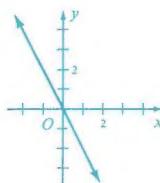
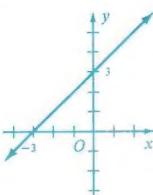
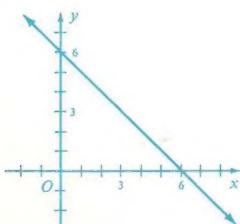
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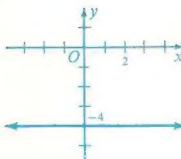
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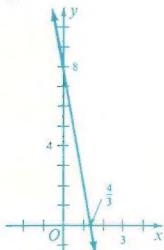
3. 5.



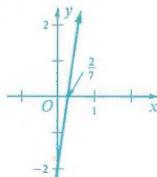
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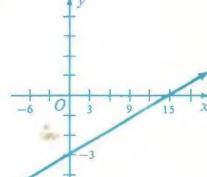
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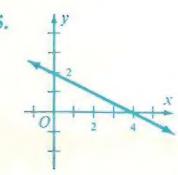
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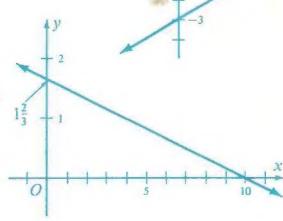
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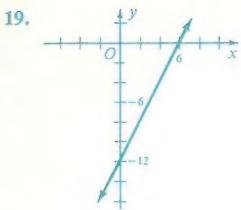
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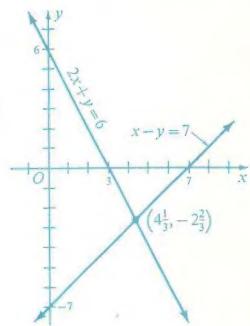
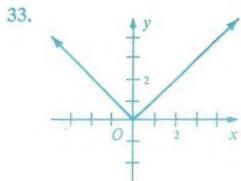
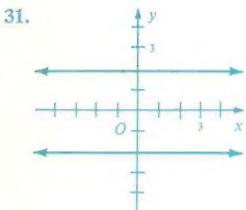
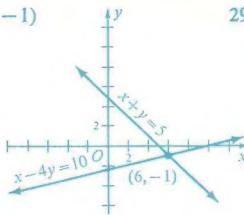
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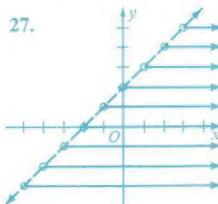
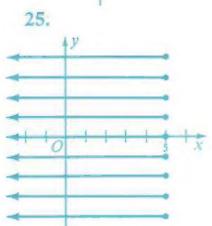
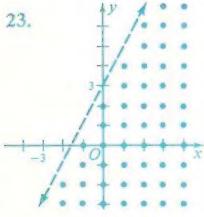
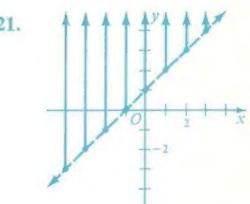
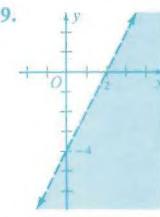
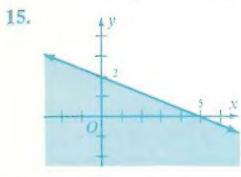
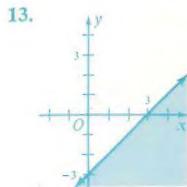
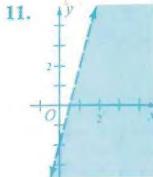
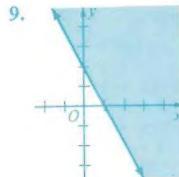
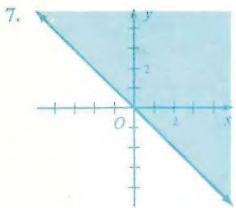
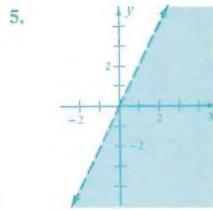
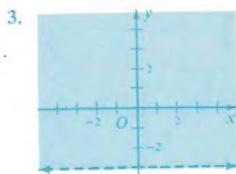
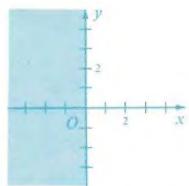
## ANSWERS FOR ODD-NUMBERED EXERCISES



B 21. -10    27.  $(6, -1)$   
23. 0    25.  $-2\frac{1}{2}$

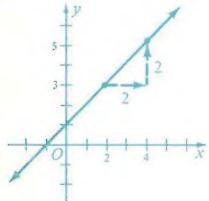


Page 167 A 1.

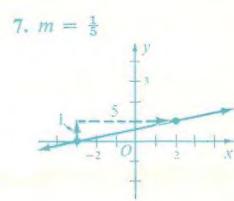
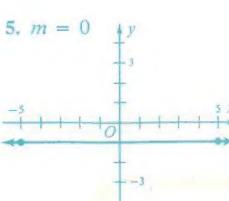
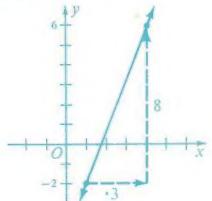


Pages 173-174

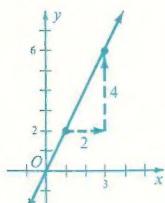
A 1.  $m = 1$



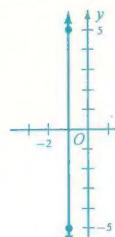
3.  $m = \frac{8}{3}$



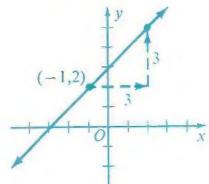
9.  $m = 2$



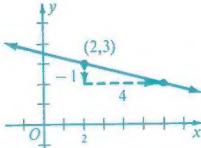
11. no slope



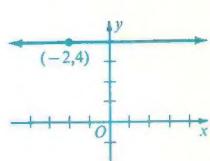
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15.



17.

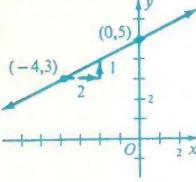


19. yes,  $m = 2$

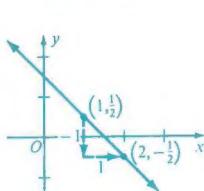
21. no

23. yes,  $m = -\frac{3}{2}$

29.  $a = 1$



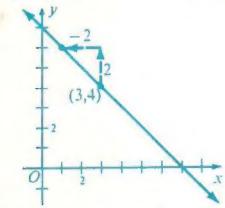
31.  $a = -\frac{1}{2}$



Pages 178-179

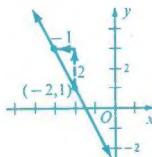
A 1. a.

b.  $x + y = 7$



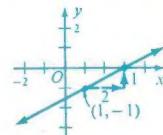
3. a.

b.  $2x + y = -3$



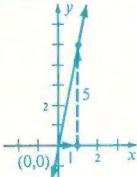
5. a.

b.  $-x + 2y = -3$



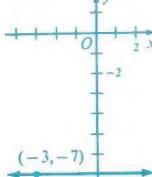
7. a.

b.  $-5x + y = 0$



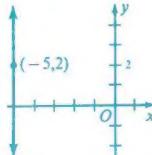
9. a.

b.  $y = -7$



11. a.

b.  $x = -5$



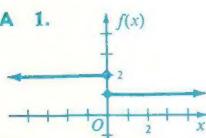
13.  $-x + y = 1$    15.  $x + 4y = 3$    17.  $x + 3y = 0$    19.  $-5x + 2y = 6$    21.  $x = 4$    23.  $3x + y = 0$   
 B 25. for example,  $y = x + 2$    27. for example,  $3x - 2y = 7$    29.  $y = 3$    31. for example,  $y = 3x + 18$   
 33.  $y = -9$    35. for example,  $7x + y = -17$    37. for example,  $y = -\frac{5}{4}x + 5$    C 39. for example,  $y = \frac{1}{2}x$   
 41.  $k = \frac{3}{2}$

 Pages 184-185 A 1. 102   3. 63   5.  $3\pi$    7.  $4\frac{1}{2}$    9. 4   11. 5   B 13.  $2\frac{1}{2}$ 

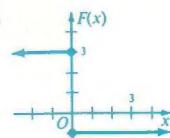
 Pages 186-187 A 1. 161 grams   3. \$1485   5. \$122,500   7. 2 lb. per sec.   B 9.  $72\frac{8}{11}$  volts   11. 1680 ft.

Pages 188-189

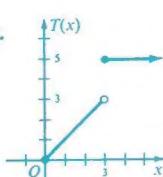
A 1.



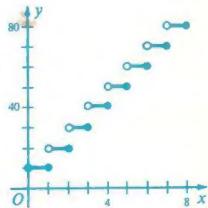
3.



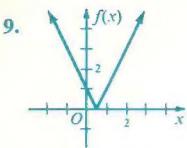
5.



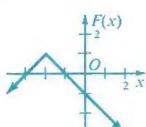
B 7.



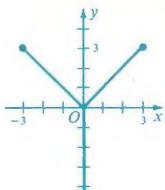
## ANSWERS FOR ODD-NUMBERED EXERCISES



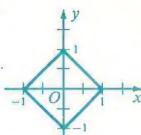
11.



C 13.



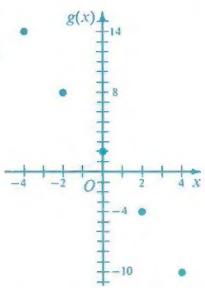
15.



Page 191 Chapter Test

1. 1

3.



5. -2

7.  $\frac{1}{2}$ 9.  $y = \frac{1}{2}x + \frac{5}{6}$ 11.  $x + y = 3$ 13.  $3\frac{3}{14}$  min.

Pages 192-193 Chapter Review

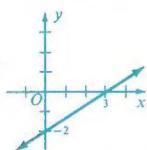
1.  $x_2; y_2$ 3.  $-1, 0, 1, 2; 1, 2, 3, 4; x + 2$ 

5. 11

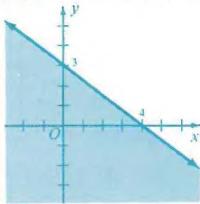
7.  $f(x)$ 

9. 2

11.



13.



15. negative 17. 4

19. 0

21. parallel (or coincident)

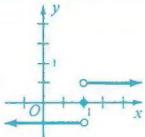
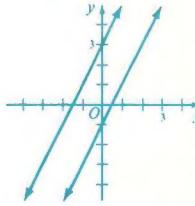
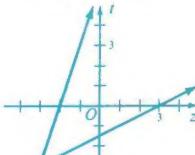
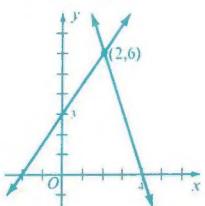
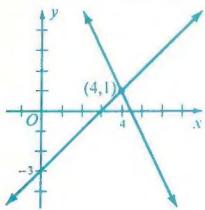
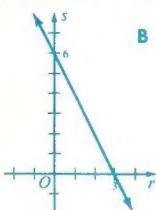
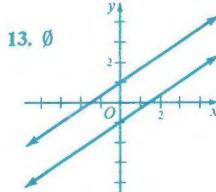
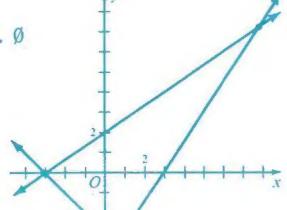
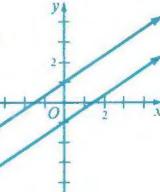
23.  $-2x + 3y = 8$ 25.  $-2x + y = 4$ 

27. means; extremes

29. 63 mi.

33.  $-\frac{1}{2}$ 

31.

Page 202 A 1.  $\{(4, 1)\}$ 3.  $\{(2, 6)\}$ 5.  $\{(-3, -3)\}$ 7.  $\emptyset$ 9.  $\{(r, s): 2r + s = 6\}$ B 11.  $\emptyset$ 13.  $\emptyset$ 15. For example,  $3x + 6y = 6$ ;

$$x + 2y = 2; \frac{x}{2} + y = 1; \frac{3}{4}x + \frac{3}{2}y = \frac{3}{2}$$

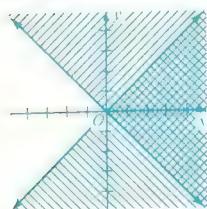
Pages 208-210 A 1.  $\{(1, -2)\}$ 3.  $\{(-\frac{5}{11}, \frac{3}{11})\}$ 5.  $\{(\frac{23}{17}, \frac{13}{34})\}$ 7.  $\{(-40, -29)\}$ 9.  $\{(9, 106)\}$ 11.  $\{(x, y): x - 8y = 11, x, y \in \mathbb{R}\}$ 13.  $\{(-\frac{37}{7}, \frac{49}{7})\}$ 15.  $\{(\frac{1}{2}, \frac{1}{2})\}$ 17.  $\emptyset$ 19.  $\{(r, s): 3r - 4s = 15, r, s \in \mathbb{R}\}$ B 21.  $\{(82, -30)\}$ 23.  $\{(-2, 5)\}$ 25.  $x = \frac{5}{2}a, y = -\frac{1}{2}a$ 27.  $x = a + b, y = a - b$ 29.  $x = \frac{ca - bd}{a^2 - b^2}, y = \frac{ad - bc}{a^2 - b^2}$ 31.  $x = \frac{-2rs + 3t}{r}, y = \frac{2rs - 2t}{s}$ 33.  $x = 2, y = 3$ 35.  $\{(x, y): \frac{2}{x} + \frac{1}{y} = \frac{8}{7}\}$

**C** 37.  $x = \frac{b}{a}$ ,  $y = \frac{a}{b}$  39.  $a = 3\frac{2}{11}$ ,  $b = \frac{5}{11}$

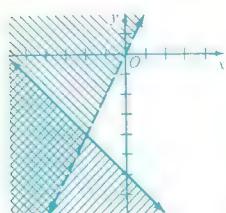
**Pages 213–216** **A** 1. Frank, 12 yr.; Mike, 7 yr. 3. 17, 42 5.  $-27, -6$  7.  $21^\circ, 69^\circ$  9. 20 dimes, 12 quarters 11. 792 lb., 1008 lb. 13. wind speed is 30 m.p.h.; airspeed is 150 m.p.h. 15. woman, 34 yr; daughter, 14 yr. 17. boat, 4 m.p.h.; current, 2 m.p.h. **B** 19.  $A = -\frac{3}{7}$ ,  $B = \frac{1}{7}$  21.  $m = 4$ ,  $b = -3$  23.  $R = 6S - 15$  25.  $\{(-2, 3)\}$  27. 45 29. 27 31. 3 m.p.h. **C** 33. worker going east, 7 m.p.h.; worker going west, 5 m.p.h.

**Pages 220–221**

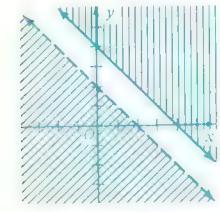
**A** 1.



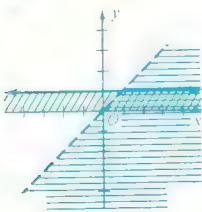
9.



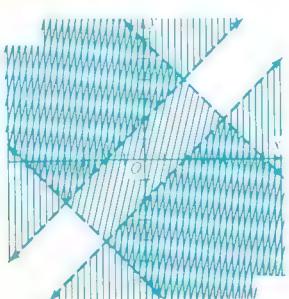
17.



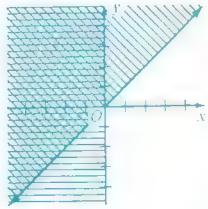
25.



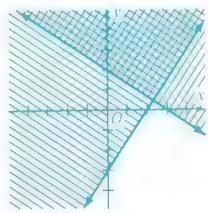
33.



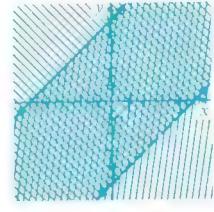
3.



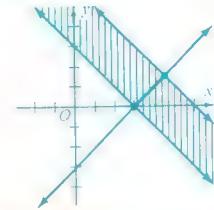
11.



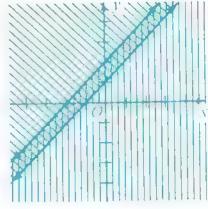
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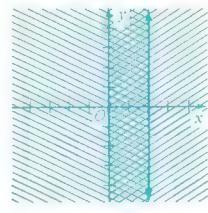
27.



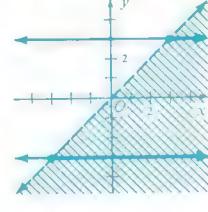
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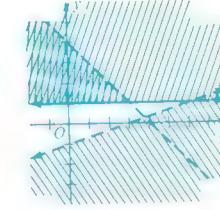
13.



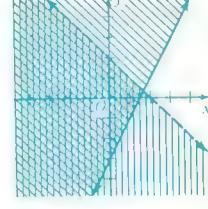
B 21.



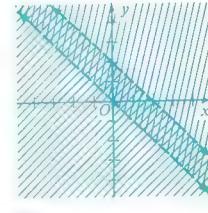
29.



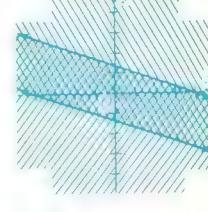
7.



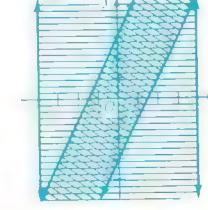
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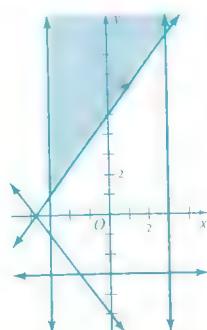
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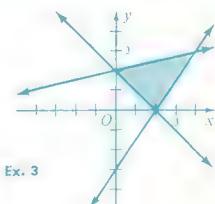
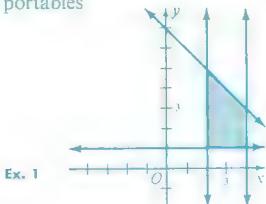
C 31.



35.

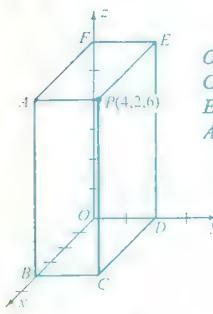


**Pages 221–223 A** 1. a. (diagram below) b.  $(2, 1), (4, 1), (2, 5), (4, 3)$  c.  $4, 10, -4, 6$  d. max., 10; min.,  $-4$   
 3. a. (diagram below) b.  $(2, 0), (0, 2), (4, 3)$  c.  $2, 6, 13$  d. max., 13; min., 2 **B** 5. b. 6 7. \$13 9. a.  
 400 consoles, 200 portables b. 400 consoles, 200 portables



**Pages 227–228**

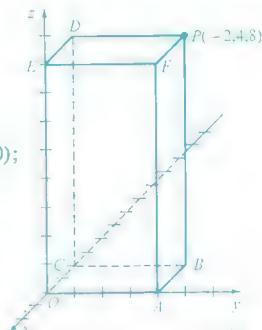
**A** 1.



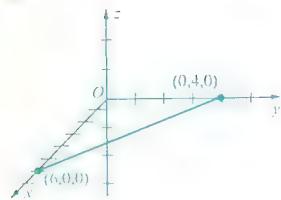
$$\begin{aligned}O(0, 0, 0); & B(4, 0, 0); \\C(4, 2, 0); & D(0, 2, 0); \\E(0, 2, 6); & F(0, 0, 6); \\A(4, 0, 6); & P(4, 2, 6)\end{aligned}$$

5.

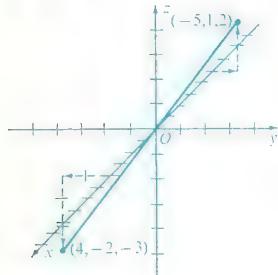
$$\begin{aligned}O(0, 0, 0); & A(0, 4, 0); \\B(-2, 4, 0); & C(-2, 0, 0); \\D(-2, 0, 8); & E(0, 0, 8); \\F(0, 4, 8); & P(-2, 4, 8)\end{aligned}$$



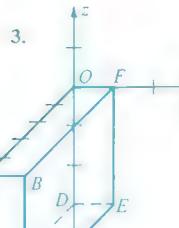
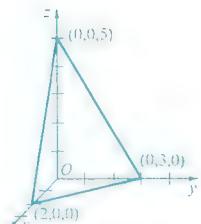
9.



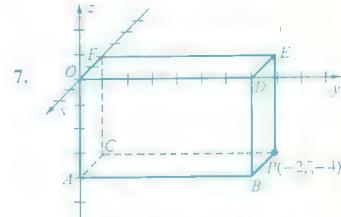
**B** 15.



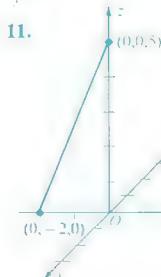
17.



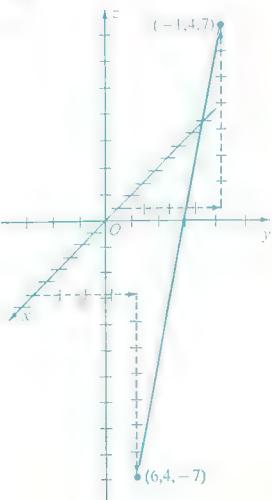
$$\begin{aligned}O(0, 0, 0); & A(5, 0, 0); \\B(5, 1, 0); & C(5, 0, -3); \\D(0, 0, -3); & E(0, 1, -3); \\F(0, 1, 0); & P(5, 1, -3)\end{aligned}$$

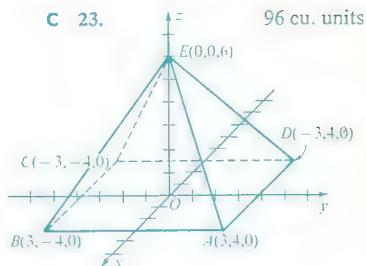
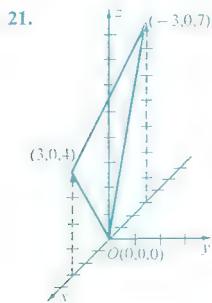
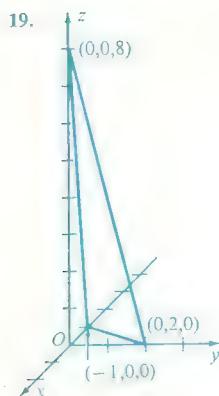


$$\begin{aligned}O(0, 0, 0); & A(0, 0, -4); \\B(0, 7, -4); & C(-2, 0, -4); \\D(0, 7, 0); & E(-2, 7, 0); \\F(-2, 0, 0); & P(-2, 7, -4)\end{aligned}$$



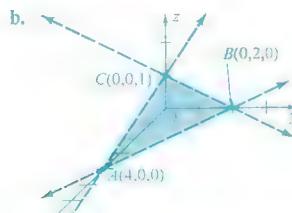
13.



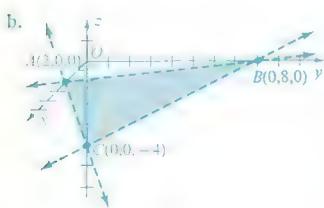


Page 234. A 1. a.  $z = 0$ ,  $x + 2y = 4$ ;  
 $y = 0$ ,  $x + 4z = 4$ ;  
 $x = 0$ ,  $2y + 4z = 4$

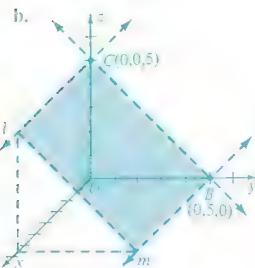
3. a.  $z = 0$ ,  $2x + 3y = 12$ ;  
 $y = 0$ ,  $2x + 3z = 12$ ;  
 $x = 0$ ,  $3y + 3z = 12$



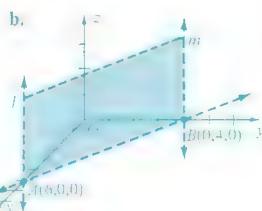
5. a.  $z = 0$ ,  $4x + y = 8$ ;  
 $y = 0$ ,  $4x - 2z = 8$ ;  
 $x = 0$ ,  $y - 2z = 8$



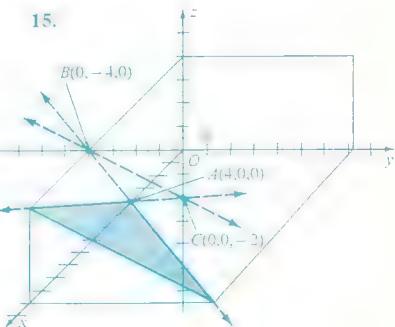
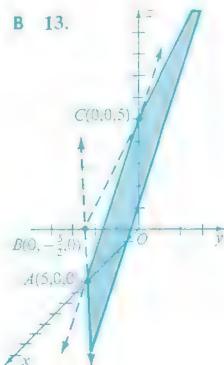
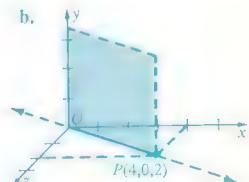
11. a.  $z = 0$ ,  $y = 5$ ;  
 $y = 0$ ,  $z = 5$ ;  
 $x = 0$ ,  $y + z = 5$

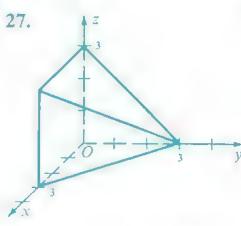
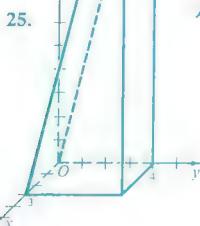
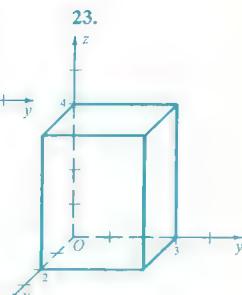
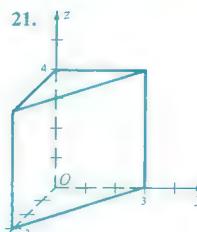
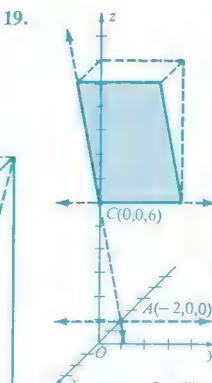
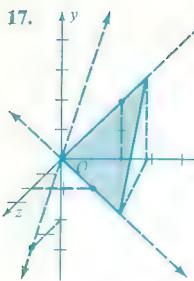


7. a.  $z = 0$ ,  $2x + 3y = 12$ ;  
 $y = 0$ ,  $x = 6$ ;  
 $x = 0$ ,  $y = 4$



9. a.  $z = 0$ ,  $x = 0$ ;  
 $y = 0$ ,  $-x + 2z = 0$ ;  
 $x = 0$ ,  $z = 0$





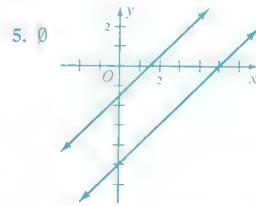
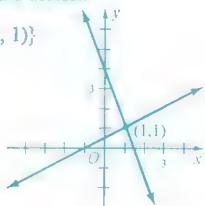
29.  $A = 2\frac{1}{5}$ ,  $B = -\frac{1}{5}$

Pages 240–241 A 1.  $\{(-\frac{1}{3}, \frac{8}{3}, -\frac{5}{3})\}$  3.  $\{(3, 4, 1)\}$  5.  $\{(-1, 0, 2)\}$  7.  $\{(-\frac{1}{2}, \frac{1}{2}, 1)\}$   
 9.  $\{(-1\frac{25}{31}, 1\frac{12}{17}, 3\frac{2}{17})\}$  11.  $\{(-2, -1, 3)\}$  13.  $\{(\frac{146}{277}, -\frac{16}{277}, \frac{41}{277})\}$  B 15.  $\{(-122, 137, -53)\}$   
 17.  $\{(1, 1, 2)\}$  19.  $\{(3, 0, -1)\}$  21. infinitely many solutions 23. no solution 25. no solution

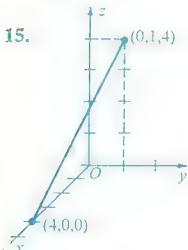
Pages 241–242 A 1. 8, 5, 3 3. longest side, 18 cm.; other two sides can have any positive lengths, each less than 18, whose sum is 22 cm. 5. 12 one-dollar bills, 15 five-dollar bills, 3 ten-dollar bills B 7. 572 9. Mr. Crosby, 30 yr.; Mrs. Crosby, 24 yr.

#### Pages 244–245 Chapter Test and Review

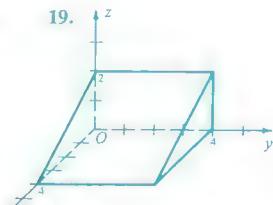
1. parallel, intersecting 3.  $\{(1, 1)\}$



9.  $\{(\frac{1}{2}(c+d), \frac{1}{2}(c-d))\}$  11. boat, 15 m.p.h.; current, 3 m.p.h. 13. max., 5; min., -8



17.  $z$



21. for example,  $j = 1, k = -2$ ; in general any values of  $j$  and  $k$  such that  $2j + k = 0$

23. 2, 3, 5

Page 249 3.  $f_2$

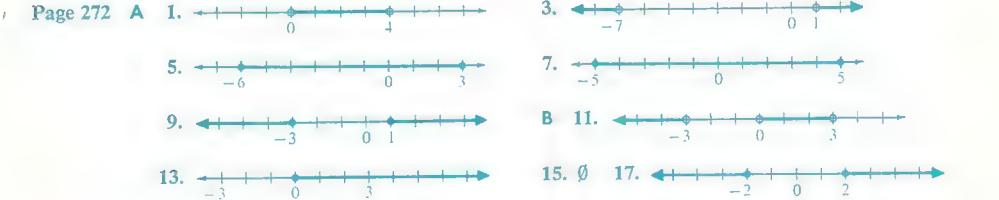
Pages 255–256 A 1.  $-24x^7$  3.  $\frac{-35}{t}$  5.  $-27a^3b^4c^2$  7.  $-24a^2$  9.  $-72m^4x^4$  11.  $-864r^8s^7t^{15}$   
 13.  $7xy^2$  15.  $\frac{1}{mk}$  17.  $16a^2$  19.  $\frac{-4p}{m^2}$  21.  $\frac{-2x^4}{9y}$  23.  $\frac{27b^3}{125c^6}$  25.  $\frac{y^5}{x^5}$  27.  $\frac{b}{6a^3}$  29.  $\frac{q^7}{p^5r^9}$  B 31.  $7a^2$   
 35.  $-172b^5$  37.  $28x^2y^2$  39.  $4x^2 - 20x^4$

**Pages 258–259 A** 1.  $x^4 + 4x^2 + 3$  3.  $\frac{1}{2}n^2 + 2n - 6$  5.  $0.09x^2 - 1$  7.  $z^6 - 6z^3 + 9$  9.  $x^{4a} + 4x^{2a} + 4$  11.  $8a^3 + 36a^2b + 54ab^2 + 27b^3$  **B** 13.  $a^3 - 3a^2 + a + 1$  15.  $a^3 + a^2b - ab^2 - b^3$  17.  $m^4 + 2m^3n - 2mn^3 - n^4$  19.  $x^3 - 5x^2 + 6x$  21.  $x^4 + 12x^3y + 54x^2y^2 + 108xy^3 + 81y^4$  23.  $x^3 + 2x^2 - 5x - 6$  25.  $2a^4 - 11a^3 + 18a^2 - 4a - 8$  27.  $15t^3 + 24t^2 - 6t$  29.  $-12x^4 + 3x^2 - x + 6$  31.  $3x^3 + 2x - 4x^0$  33.  $4x^{-2} - 9x^0$  35.  $25x^0 - 20x^{-3} + 4x^{-6}$  37. 3 39. 2 41. -7  
43.  $y = -1$

**Pages 264–265 A** 1.  $2(x + 3)(x - 3)$  3.  $x(x + 2)(x - 2)$  5.  $5(a - 3)^2$  7.  $-(k - 18)^2$   
9.  $(m + n)(m^2 - mn + n^2)$  11.  $(4x - 1)(16x^2 + 4x + 1)$  13.  $(3 + 2y)(3 - 2y)$  15.  $(5 - y) \times$   
 $(25 + 5y + y^2)$  17.  $(y + 6)(y - 2)$  19.  $-(x + 3)(x - 2)$  21.  $3(3y + 1)(2y - 3)$  23.  $(m - 18n) \times$   
 $(m + 20n)$  **B** 25.  $(x^2 - 3)(x^4 + 3x^2 + 9)$  27.  $(mn^2 + d)(m^2n^4 - mn^2d + d^2)$  29.  $(1 - 2n^2) \times$   
 $(1 + 2n^2 + 4n^4)$  31. prime 33.  $(x + y)(a - b)$  35.  $(a - 1)(3a - 2x)$  37.  $(x - 1 + y)(x - 1 - y)$   
39.  $(a + 11)^2$  41.  $(x + y - 4)(x - y)$  43.  $(h + 3)(h - 3)(h + 4)$  45.  $2a^2(a + 9)(a - 4)$  47.  $(x^a -$   
 $2)(x^a - 1)$  49.  $x^2(x^2 + x + 1)$  51.  $2(2x - 1)(4x^2 + 2x + 1)$  **C** 53.  $(x^a + 1)(x^a - 1)$  55.  $(t^p - 1)^2$   
57.  $(3r^{2m} - 1)(t^{2m} - 3)$  59.  $(x - 2y)^3(1 + x - 2y)(1 - x + 2y)$  61.  $(t - 1)^3(t - 2)(t^2 - t + 1)$   
63.  $4(y + 2)^2(y - 2)$  65.  $(5x^2 - y^2 + xy)(5x^2 - y^2 - xy)$

**Pages 268–269 A** 1.  $\{3, 1\}$  3.  $\{-4, 8\}$  5.  $\{0, 9\}$  7.  $\{3\}$  9.  $\{-3, 3\}$  11.  $\{0, \frac{5}{2}\}$  13.  $\{6, 2\}$   
15.  $\{\frac{1}{2}, 2\}$  17.  $\{-\frac{1}{2}, -\frac{2}{3}\}$  19.  $\{-1, 1\}$  21.  $\{\frac{2}{3}, -1\}$  23.  $\{3, 2\}$  25.  $\{-15, 24\}$  **B** 27.  $\{8a, -2a\}$   
29.  $\left\{\frac{5}{n}, -\frac{8}{n}\right\}$  31.  $\{0, 3, -2\}$  33.  $\{0, 6, 1\}$  35.  $\{2, -2, 1, -1\}$  **C** 37.  $\{0, -3, 3, 1, -1\}$  39.  $\left\{\frac{1}{a+b}\right\}$   
41.  $\{1, -1, 4\frac{1}{2}\}$  43.  $\{a + b + 2\}$

**Pages 269–271 A** 1. 17 yr. 3. 13 in. 5. 3, 4, 5, 6 7. 14 in. 9. base, 10 ft.; altitude, 8 ft. 11. 8, 10, 12  
13. 10 ft. 15. 400 sec. **B** 17.  $m(\overline{CE}) = 6$ ,  $m(\overline{ED}) = 8$ ; or  $m(\overline{CE}) = 8$ ,  $m(\overline{ED}) = 6$  19. 15 in., 20 in.  
**C** 21. 6 or -1



**Pages 276–277 A** 1.  $-2x^2 + 3xy + 8y^2$  3.  $-a^2 + a - 1$  5.  $4a - 3 + \frac{1}{a}$  7.  $x + 12$  9.  $2n + 7$   
11.  $3x - 2$  13.  $3n^2 - 2n + 3$  15.  $x - 2 - \frac{2}{x+6}$  17.  $x - 3 + \frac{3}{x+3}$  19.  $2a^2 + 5a + 2$   
**B** 21.  $y - a + \frac{2a^2}{y+a}$  23.  $x^2 - ax + a^2$  25.  $2t^2 + 2t + \frac{3}{1-t}$  27.  $-x^2 + 2x - 8 + \frac{20}{x+2}$   
29.  $b^2 + 2b + 3$  31.  $-2x^2 + 15x - 35 - \frac{129x - 76}{2 - 3x - x^2}$  33.  $a^2 + 2a + 2$  **C** 35. yes 37. 8  
39.  $a = -5$ ,  $b = 15$

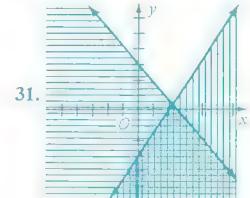
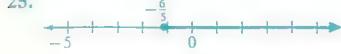
**Pages 279–280 A** 1.  $\frac{7}{27}$  3.  $\frac{-s}{8r^2}$  5.  $3x - 4$  7.  $\frac{s}{5s+7}$  9. -1 11.  $\frac{1}{2b+3}$  13. 2 15.  $\frac{1}{a-1}$   
17.  $\frac{2}{x+3}$  19.  $\frac{2c-1}{2c+1}$  21.  $\frac{1}{x+6}$  23.  $\frac{t-2}{t-1}$  25.  $\frac{k^2+k+1}{2(k+2)}$  **B** 27. 1 29.  $\frac{(x^2+y^2)(x+y)}{4}$   
31.  $\frac{1-2v}{v^2-2}$  **C** 33.  $\frac{-2t(t^2+3)(t^2+21)}{(t^2-6)^4}$  35.  $\frac{2y(y^3+4)(-4y^3+6y^2+3y-16)}{(2y+1)^5}$

**Pages 282–283 A** 1.  $-\frac{9}{8}$  3.  $\frac{2400}{x^6}$  5.  $\frac{15a}{2}$  7. 2 9.  $\frac{5b^2}{2}$  11.  $\frac{3c}{5}$  13.  $\frac{-225}{2y}$  15.  $\frac{x+1}{x-1}$  17.  $\frac{1}{y-8}$   
19.  $\frac{2(z+4)}{z-2}$  21. 1 **B** 23.  $\frac{4}{9a^3c^2}$  25.  $\frac{2a-1}{2a+1}$  27.  $\frac{2x+1}{3+2x}$

**Pages 286–287 A** 1.  $\frac{10}{7}$  3.  $\frac{34}{15}$  5.  $\frac{15}{2}$  7. 1 9.  $\frac{7x-3}{3x^2}$  11.  $\frac{26m+n}{12n}$  13.  $\frac{2a^2+3-4a}{4a^2}$   
15.  $\frac{5x-11}{6}$  17.  $\frac{17n^2-2n+6}{12n^2}$  19.  $\frac{x+1}{x}$  21.  $\frac{x+5}{x+2}$  23.  $\frac{7x-2}{3x(x+1)}$  25.  $\frac{4x}{(x+1)(x-1)}$  27.  $\frac{1}{12}$

29.  $\frac{9t^2 + 1}{3t - 1}$  31.  $x$  33.  $\frac{n-1}{n+2}$  35.  $\frac{2a(a-2)}{4-a}$  B 37.  $\frac{-2}{t}$  39.  $\frac{2}{y(y-1)}$  41.  $\frac{x-3}{2x-1}$  43.  $\frac{-3}{m^2-1}$   
 45.  $\frac{x^4+x-12}{x^2+3}$  47.  $\frac{r-s}{r^2-rs+s^2}$  49.  $\frac{t+1}{2t+1}$  51.  $\frac{b^2-a^2}{ab}$  C 53.  $\frac{s(4r-s)}{(2s-r)(s-r)}$   
 55.  $\frac{3(2y-3)(y+2)}{(2y+3)(y+3)}$  57.  $\frac{a^2+1+a}{a^2+1}$  59.  $\frac{a-1}{a+1}$

Pages 290-291 A 1. {6} 3. {-6} 5.  $\emptyset$  7. {7,500} 9.  $\left\{-\frac{4}{3}, \frac{2}{3}\right\}$  11. {-1, 4} 13.  $\{0, -\frac{2}{3}, \frac{5}{12}\}$   
 15.  $\left\{-\frac{3}{7}\right\}$  17.  $\left\{-\frac{1}{2}\right\}$  B 19.  $\left\{\left(1, \frac{9}{2}\right)\right\}$  21.  $\left\{(-1, 6)\right\}$  23.  $\left\{\left(\frac{1}{7}, -\frac{8}{21}\right)\right\}$



33.  $\frac{1}{25}(5x+1)(5x-1)$  35.  $\frac{1}{6}(3a-2)^2$  37.  $0.001(10z-3)(100z^2+30z+9)$  39.  $\frac{1}{12}x(4x-3)(3x+2)$

Pages 291-294 A 1. C - 1, 200 ft.; C - 2, 350 ft. 3. 12, 18 5. 18 min. 7. 6 mi. 9.  $\frac{42000}{11}$  in./sec.  
 11. 6 oz. 13.  $2\frac{3}{10}$  oz. 15. 6 tons B 17. 24 min. 19. \$23.81 21.  $\frac{3}{14}$  hr. 23. 100 lb. C 25. 0.14 hr.  
 27. 312 ft.

Pages 296-297 A 1. {9} 3. {5} 5.  $\left\{-\frac{5}{2}\right\}$  7.  $\emptyset$  B 9. {2} 11. {2} 13.  $\emptyset$  15. {-2, 2} 17. {2}  
 19.  $\left\{-\frac{1}{2}, 5\right\}$  C 21.  $\left\{(2, -1)\right\}$  23.  $\left\{(1, 5)\right\}$  25.  $\left\{(\frac{1}{2}, -1)\right\}$  27.  $\left\{(-3, -\frac{1}{2})\right\}$  29. {2} 31. {24}

Pages 297-300 A 1. 15 m.p.h. 3. 36, 66 5. 30 7.  $\frac{62}{56}$  9.  $6\frac{2}{3}$  hr. 11. 12 m.p.h. 13.  $1\frac{1}{3}$  hr.  
 B 15. 91 mi. 17.  $\frac{6}{7}$  19. 20 pt./min. 21. \$60 23. 10 C 25. 399 m.p.h. 27.  $37.5 \leq$  lb. of tin  $\leq 80$

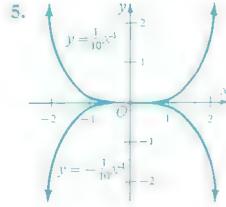
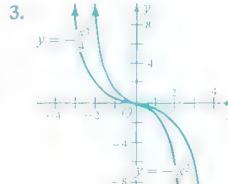
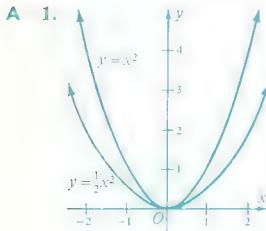
Page 301 Chapter Test and Review 1.  $\frac{-72x^3}{z}$  3.  $3x^2 + 10xy - 8y^2$  5.  $z(2z-5)(3z+1)$  7.  $\{-5, \frac{2}{3}\}$   
 9. 6, 7 11.  $2x^2 - 3x - 4$  13.  $\frac{a}{8b^2}$  15. {4} 17. {13}

Page 302 Cumulative Review 1. conjunction,  $2 = 1 \neq 5$  and  $3 + 7 = 4$ , false; disjunction,  $2 = 1 \neq 5$  or  $3 + 7 = 4$ , true 3. -16 5. 24 7. {3} 9.  $\leftarrow \frac{1}{3} \frac{1}{2} \frac{1}{1} \frac{1}{0} \frac{1}{2} \frac{1}{1} \frac{1}{2} \rightarrow$  11.  $\frac{1}{3}, \frac{1}{6}$  13.

15.  $17\frac{1}{2}$  17.  $\{(1, -1, 2)\}$  19.  $5x^2 + 3x - 6$  21.  $\{\frac{2}{3}, -4\}$  23. 20 m.p.h.



Pages 310-311



7. 1 9.  $-\frac{8}{3}$   
 11.  $-\frac{1}{3}$  13. 50  
 15.  $\frac{81}{4}$

B 17. 1728 19.  $s$  is multiplied by 4. 21.  $k$  is multiplied by  $\frac{1}{8}$ . C 23.  $\pm\frac{1}{2}$  25.  $\frac{4k}{9}$

Pages 311-312 A 1. 576 ft. 3. 55,102 Btu. 5.  $1066\frac{2}{3}$  horsepower 7.  $1\frac{1}{3}$  B 9. 27 ft.-lb.

Pages 314-315 A 1. 1.7 3. 1.2 5. -1.9 7. -1.5 9. 1.4 11.  $\left\{\frac{7}{6}, -\frac{7}{6}\right\}$  13.  $\left\{-\frac{5}{4}\right\}$  15.  $\emptyset$   
 17.  $\left\{\frac{10}{11}, -\frac{10}{11}\right\}$  B 19. {-12} 21. 4 23.  $-\frac{5}{6}$

Pages 319-320 B 15. {1} 17. {-4, 2, 3} 19.  $\left\{-\frac{1}{3}\right\}$  21.  $\left\{0, \frac{15}{2}\right\}$

Page 324 A 1. 0.28 3. 0.64 5. 2.03 7. -1.07 9.  $\frac{27,777}{10,000}$  11.  $\frac{-12}{10,000}$  13.  $\frac{2}{9}$  15.  $\frac{56}{99}$  17.  $\frac{35,665}{1110}$

19.  $\frac{-32}{9000}$  21. 2.23; 2.2 23.  $-1.25; -1.2$  25–33 Answers will vary. 25. ratl., 0.7 and irr., 0.7070070007...  
 27. ratl., 1.3 and irr., 1.303303330... 29. ratl.,  $-0.365$  and irr.,  $-0.3663666366663...$  B 31. ratl., 1.2591 and irr., 1.2592020020002... 33. ratl., 3.1418 and irr., 3.142020020002...

Pages 327–329 A 1. 33.94 3. 13.42 5. 0.78 7. 4.58 9. 254.52 11.  $-3.78$  13. 1.00 15.  $\frac{2\sqrt{3}}{3}$   
 17.  $-8\sqrt{2}$  19.  $4x^2\sqrt{2x}, x \geq 0$  21.  $2x\sqrt[3]{4y}$  23.  $ab\sqrt[3]{a}$  25.  $\frac{\sqrt[5]{a^3}}{a}, a \neq 0$  27.  $\frac{\sqrt[5]{k^4}}{k^2}, k \neq 0$   
 29.  $\frac{2y^2\sqrt[6]{2x^4}}{x^2}, x \neq 0$  31.  $30ab\sqrt[3]{4}$  33.  $3h\sqrt[3]{3g^2h}, g \geq 0, h \geq 0$  35.  $6x^2\sqrt{2}, x > 0$  37.  $\frac{\sqrt{3a^2+1}}{3a^2+1}$   
 39.  $\frac{k^2\sqrt[3]{8}}{2}, k \neq 0$  41.  $|a-2|$  B 43.  $81r^8, r \neq 0$  45.  $\frac{a\sqrt[4]{4}}{4}, a > 0$  47.  $\frac{(x+3)^2\sqrt{x}}{|x|x-7|}, x > 0, x \neq 7$   
 49.  $\frac{3a}{\sqrt{15a}}$  51.  $\frac{2(x+1)^2}{\sqrt[3]{4(x+1)^2}}$  53.  $\frac{7(t^2+3)}{\sqrt[3]{343(t^2+3)^3}}$

Pages 329–330 A 1.  $\frac{11\sqrt{6}}{7}$  sec.  $\approx 4$  sec. 3.  $4\sqrt{2}$  in.  $\approx 6$  in. 5.  $400\sqrt{2}$  ft./sec.  $\approx 566$  ft./sec.  
 B 7.  $\frac{32\sqrt{77}}{7}$  cm.  $\approx 40$  cm. 9.  $\frac{\sqrt{6\pi}}{6} \approx \frac{5}{7}$

Pages 331–332 A 1. a. irrational b.  $-7.52$  3. a. rational 5. a. irrational b. 5.13 7. a. irrational  
 b.  $-17.14$  9. a. rational 11. a. irrational b. 4.23 13.  $\frac{11}{2}\sqrt{5}$  15.  $-114x\sqrt{x}$  17.  $3\sqrt{4}(y^2+1)$   
 19.  $(5y-2)\sqrt[3]{5y^2} + y^2\sqrt{5}$  B 21.  $\sqrt[3]{3y}(10-2y)$  23.  $-\frac{13n}{60}$  25.  $-\frac{\sqrt{x}}{x^2}$  27.  $\{\sqrt{2}\}$  29.  $\{1\}$   
 31.  $\{1-2\sqrt{7}, 1+2\sqrt{7}\}$  33.  $\left\{-5-\frac{\sqrt{2}}{11}, -5+\frac{\sqrt{2}}{11}\right\}$  35.  $\{-2\sqrt{3}, 2\sqrt{3}\}$

Pages 333–334 A 1.  $30\sqrt{5} - 25\sqrt{2}$  3.  $-1$  5.  $5 + 2\sqrt{6}$  7.  $\frac{2+\sqrt{3}}{2}$  9.  $57 - 13\sqrt{6}$  11.  $\sqrt[3]{4} - 1$   
 13.  $a\sqrt[3]{a^2} - \sqrt{a}$  15.  $\frac{\sqrt{7}-1}{2}$  17.  $-13(\sqrt{3} - \sqrt{2})$  19.  $-7(2 - \sqrt{5})$  21.  $\frac{5\sqrt{3}+7}{2}$  B 23. 4  
 25.  $a+b$  27.  $\frac{2(a+b)}{a-b}$  29. 0 31.  $\frac{\sqrt{x+1}-2}{x-3}$  33.  $\frac{\sqrt[3]{25} + \sqrt[3]{5} + 1}{4}$  35.  $\frac{4\sqrt{3} + \sqrt{6}}{7}$   
 C 37.  $\frac{1}{\sqrt{z-1}}$  39.  $-\frac{1}{\sqrt[3]{(x^2+1)^2}}$  41.  $(y+3\sqrt{3})(y-3\sqrt{3})$  43.  $(t+\sqrt{6})^2$  45.  $(n-2\sqrt{3})^2$   
 47.  $(a+b+\sqrt{2})(a+b-\sqrt{2})$

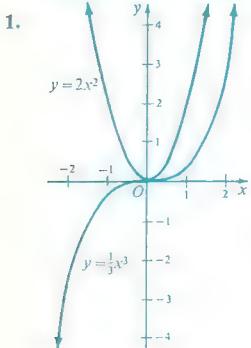
Pages 336–337 A 1. {64} 3. {62} 5. {3} 7. {32} 9.  $\left\{-\frac{1}{8}\right\}$  11. {4} 13. {−4, 3} 15. {3}  
 17.  $\emptyset$  19. {−4} 21.  $\emptyset$  23. {2, 3} 25. {1, 7} 27.  $\emptyset$  B 29.  $\left\{-\frac{34}{5}, 4\right\}$  31. {4} 33. {9} 35.  $\emptyset$   
 37.  $\frac{3w}{4\pi r^3}$  39.  $-\sqrt{c^2 - b^2}$  41.  $\frac{T}{4b^2 - 1}$

Pages 340–342 A 1. {7, −1} 3. {4 +  $\sqrt{17}$ , 4 −  $\sqrt{17}$ } or {8.1, −0.1} 5.  $\left\{\frac{-5-3\sqrt{5}}{2}, \frac{-5+3\sqrt{5}}{2}\right\}$   
 or {−5.9, 0.9} 7.  $\left\{-\frac{5}{2}, \frac{2}{3}\right\}$  9.  $\left\{-1 + \sqrt{13}, -1 - \sqrt{13}\right\}$  or {−0.8, 0.4} 11.  $\left\{\frac{4+2\sqrt{29}}{5}, \frac{4-2\sqrt{29}}{5}\right\}$  or  
 {−1.4, 3.0} 13.  $\left\{-\frac{5}{3}\right\}$  15.  $\left\{\frac{-4+\sqrt{10}}{3}, \frac{-4-\sqrt{10}}{3}\right\}$  or {−2.4, −0.3} 17.  $\left\{\frac{1}{2}, -\frac{1}{4}\right\}$   
 19.  $\left\{\frac{1+\sqrt{97}}{4}, \frac{1-\sqrt{97}}{4}\right\}$  or {−2.2, 2.7} B 21.  $\left\{\frac{3}{7}, -\frac{2}{5}\right\}$  23.  $\left\{\frac{3+\sqrt{57}}{6}, \frac{3-\sqrt{57}}{6}\right\}$  or {−0.8, 1.8}  
 25.  $\left\{\frac{1+\sqrt{37}}{2}, \frac{1-\sqrt{37}}{2}\right\}$  or {−2.5, 3.5} 27. {−1 +  $\sqrt{2}$ , −1 −  $\sqrt{2}$ } or {−2.4, 0.4} 29.  $\left\{\frac{-1+3\sqrt{5}}{2}, \frac{-1-3\sqrt{5}}{2}\right\}$   
 or {−3.9, 2.9} 31.  $\emptyset$  33.  $\left\{\frac{\sqrt{6}+\sqrt{2}}{2}, \frac{\sqrt{6}-\sqrt{2}}{2}\right\}$  or {0.5, 1.9} 35.  $\left\{-1 + \sqrt{\sqrt{5}+1}, -1 - \sqrt{\sqrt{5}+1}\right\}$  or {−2.8, 0.8} C 37.  $\left\{\frac{10+3\sqrt{2}}{2}, \frac{10-3\sqrt{2}}{2}\right\}$  or {−0.5, 3.7} 39.  $\left\{\frac{-1+\sqrt{3}}{2}, 1\right\}$  or  
 {−1.4, 1} 41.  $\left\{\sqrt{-2+\sqrt{5}}, -\sqrt{-2-\sqrt{5}}\right\}$  or {−0.5, 0.5} 43.  $\{\sqrt[4]{3}, -\sqrt[4]{3}\}$  or {−1.2, 1.2}  
 45.  $(x-1+\sqrt{2})(x-1-\sqrt{2})$  47.  $y(y+3+\sqrt{7})(y+3-\sqrt{7})$

**Pages 342–343 A** 1.  $12\frac{1}{2}$  cm.,  $7\frac{1}{2}$  cm. 3. 9.5 in., 15.5 in. 5.  $-3 + \sqrt{11}$  m. **B** 7.  $384 - 256\sqrt{2}$  sq. in. 9. 6 **C** 11. 3 in.,  $2\frac{1}{2}$  in.

**Pages 345–346 A** 1.  $x^2 + 5x + 6 = 0$  3.  $2x^2 - 3x - 2 = 0$  5.  $3x^2 - x = 0$  7.  $6x^2 + 5x + 1 = 0$  9.  $x^2 + 4x + 4 = 0$  11.  $x^2 - 6x + 7 = 0$  13.  $16x^2 + 16x + 1 = 0$  15.  $x^2 - 2\sqrt{2}x - 1 = 0$  17.  $x^2 - (1 + \sqrt[3]{2})x = 0$  **B** 19.  $x = \frac{2}{5}$ ,  $b = 23$  21.  $x = 2 - \sqrt{3}$ ,  $c = 3$  23.  $x = -\frac{3}{2}$ ,  $c = \frac{27}{2}$  **C** 25.  $-4 + 2\sqrt{7}$ ,  $-4 - 2\sqrt{7}$

**Pages 347–348 Chapter Test and Review**



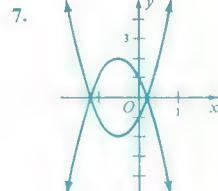
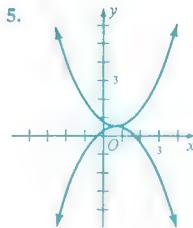
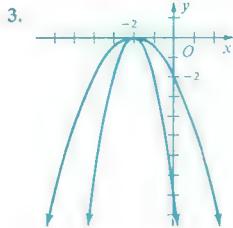
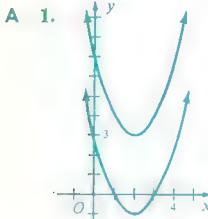
1.  $y = 2x^2$  3.  $\{-\frac{3}{2}, \frac{3}{2}\}$  5. 1, 2, and -3 7. for example, a. rational no. = 0.81

b. irrational no. = 0.81881888188881... 9.  $12\sqrt{3} - 52\sqrt{2}$

11. 8.3 in., 12.4 in., 16.6 in. 13. a.  $\{1 + \frac{1}{2}\sqrt{3}, 1 - \frac{1}{2}\sqrt{3}\}$  or  $\{1.9, 0.1\}$

15.  $2x^2 - 10x - 19 = 0$

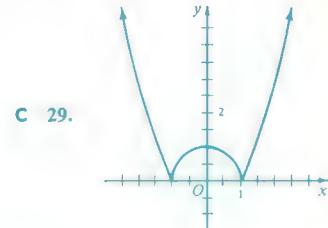
**Pages 357–358**



9.  $a = 1$  11.  $k = 3$  13.  $h = 3$  or  $h = -3$

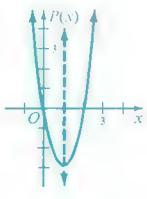
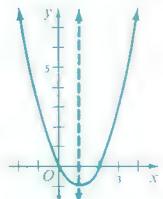
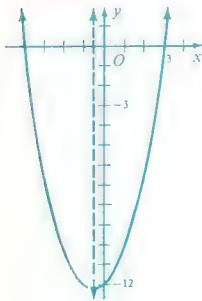
**B** 15.  $h = 2$  17.  $h = -2$  or  $h = 6$  19. 5, -1

21.  $-1, -5$  23.  $a = 1, k = -5$  25.  $k = 3, a = \frac{1}{2}$



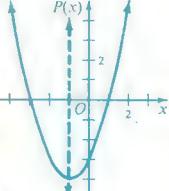
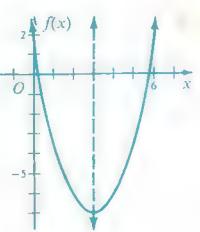
**Pages 360–361 A** 1. axis:  $x = 1$ ; vertex:  $(1, -1)$  3. axis:  $x = 1$ ; vertex:  $(1, -3)$

7. axis:  $x = -\frac{1}{2}$ ; vertex:  $(-\frac{1}{2}, -12\frac{1}{4})$

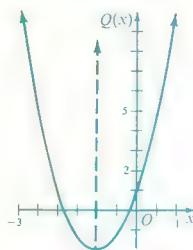


9. axis:  $x = 3$ ; vertex:  $(3, -7)$

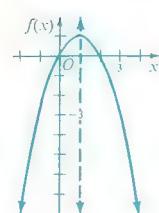
5. axis:  $x = -1$ ; vertex:  $(-1, -4)$



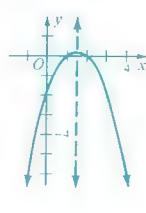
**11.** axis:  $x = -1$ ; vertex:  $(-1, -2)$



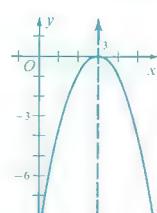
**13.** axis:  $x = 1$ ; vertex:  $(1, 1)$



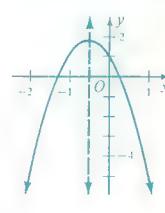
**15.** axis:  $x = \frac{3}{2}$ ; vertex:  $(\frac{3}{2}, \frac{1}{4})$



**17.** axis:  $x = 3$ ; vertex:  $(3, 0)$



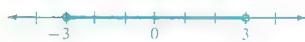
**19.** axis:  $x = -\frac{1}{2}$ ; vertex:  $(-\frac{1}{2}, \frac{13}{4})$



Pages 361–362 **B** 1. 5, 5 3. 25 sq. in. 5. 276 ft. 7. 275 watts **C** 9. The wire should be cut at its midpt. 11. \$3125 13. a.  $6x - x^2$  b. 9 sq. units

### Page 364

**A** 1.  $\{x: -3 < x < 3\}$



3.  $\{x: 0 \leq x \leq 3\}$



5.  $\{x: -5 \leq x \leq 2\}$



7.  $\{x: -3 < x < \frac{1}{2}\}$



9.  $\left\{x: \frac{3 - \sqrt{33}}{4} \leq x \leq \frac{3 + \sqrt{33}}{4}\right\}$



11.  $\{\sqrt{3}\}$



**B** 13.  $\{x: -2 \leq x \leq 0 \text{ or } x \geq 2\}$



15.  $\{x: x \leq -1 \text{ or } 2 \leq x \leq 3\}$



Pages 368–369 **A** 1.  $i$  3.  $-1$  5.  $-5$  7.  $\frac{1}{2}i\sqrt{2}$  9.  $20i\sqrt{3}$  11.  $-6\sqrt{35}$  13.  $-4\sqrt{10}$  15.  $25i$   
17.  $-2$  19.  $12i$  21.  $2$  23.  $3\sqrt{2}$  25.  $8\sqrt{2}$  27.  $-\frac{i}{4}$  29.  $-2i\sqrt{3}$  31.  $-2i\sqrt{7}$  33.  $7i\sqrt{2}$   
35.  $(8 - \sqrt{5})i$  37.  $\sqrt{7} - 2i\sqrt{7}$  **B** 39.  $-\frac{7}{10}i\sqrt{5}$  41.  $16i\sqrt{2}$  43.  $0$  45.  $-1 - 2i$  **C** 47.  $7x^2i$   
49.  $-4yi\sqrt{2}$

Pages 373–374 **A** 1. a.  $2 + 10i$  b.  $2 + 8i$  c.  $-9 + 2i$  d.  $9 - 2i$  3. a.  $1 + 2i$  b.  $-1 - 4i$  c.  $3 - i$  d.  $-0.3 - 0.1i$  5. a.  $12 - 2i$  b.  $2 + 2i$  c.  $35 - 14i$  d.  $\frac{85}{29} + \frac{14}{29}i$  7. a.  $12i$  b.  $10$  c.  $-61$  d.  $\frac{11}{61} - \frac{60}{61}i$  9. a.  $1 + 10i$  b.  $-5 + 2i$  c.  $-30 + 10i$  d.  $\frac{13}{25} + \frac{26}{25}i$  11. a.  $-1 + 11i$  b.  $3 - i$  c.  $-32 - 4i$  d.  $\frac{7}{10} - \frac{8}{5}i$  13.  $\{(-2, 5)\}$  15.  $\{(2, 5)\}$  17. conj. is  $-i$ ; recip. is  $-i$  19. conj. is  $2 + i$ ; recip. is  $\frac{2}{5} + \frac{1}{5}i$  21. conj. is  $-2 - i$ ; recip. is  $-\frac{2}{5} - \frac{1}{5}i$  **B** 23.  $6 + 12i$  25.  $-3 + 5i$  27.  $10 + 2i$  29. 47 31.  $\{3 + 3i\}$  33.  $\{6 - 3i\}$  **C** 35.  $\{(-2, 2)\}$

Pages 377–378 **A** 1. two unequal ratl. roots 3. two unequal irratl. roots 5. two complex conjugate roots  
7. two unequal irratl. roots 9. two complex conjugate roots 11. two unequal real zeroes, both ratl. 13. no  
real zeros 15.  $\{6, 3\}$  17.  $\left\{-\frac{1}{2} + \frac{\sqrt{11}}{2}i, -\frac{1}{2} - \frac{\sqrt{11}}{2}i\right\}$  19.  $\left\{\frac{5}{4} + \frac{\sqrt{31}}{4}i, \frac{5}{4} - \frac{\sqrt{31}}{4}i\right\}$  **B** 23.  $2\sqrt{5}$  or  
 $-2\sqrt{5}$  25.  $k < -4$  **C** 29. a.  $\emptyset$  b.  $\{i + \sqrt{2}, i - \sqrt{2}\}$

Pages 380–381 **A** 1. 27 3.  $-173$  5. 370 7. 100 9. 58 11. 376 13.  $-26$  15. 7366 17. 0;  
 $a$  is a zero of  $P$  19. 0;  $c$  is a zero of  $P$  **B** 21. 4 23. 32 25.  $-\frac{29}{4}$  27.  $a = 2, b = -1$

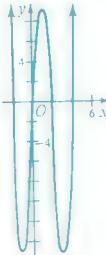
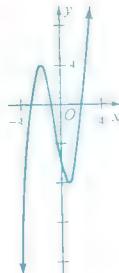
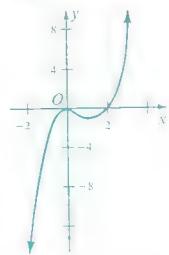
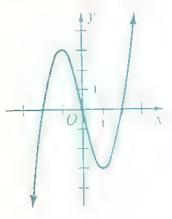
Pages 384–385 **A** 1.  $(x - 2)(3x^2 + 4x + 10) + 21$  3.  $(x + 3)(x^2 + x) + 2$  5.  $3x^2 + 2x + 5 +$   
 $\frac{0}{x + 3}$  7.  $3x^3 + (-6 + 6i)x^2 - (12 + 12i)x + 27 - 24i + \frac{52 + 54i}{x - 2i}$  17.  $2x^2 - 3x - 27$

19.  $2x^2 - 5x + 1$  21.  $\{-1, -\frac{3}{2} + \frac{1}{2}i\sqrt{11}, -\frac{3}{2} - \frac{1}{2}i\sqrt{11}\}$  23.  $\left\{-1, \frac{5}{6} + \frac{\sqrt{61}}{6}i, \frac{5}{6} - \frac{\sqrt{61}}{6}i\right\}$  25.  $\{2, 3, -4\}$   
27.  $\{-2, -\frac{3}{2}, -1, 1\}$  **B** 33.  $-18$  35. 6 37.  $\{\frac{1}{2}i(1 - \sqrt{5}), \frac{1}{2}i(1 + \sqrt{5})\}$  39.  $\{i, -i\}$

Pages 388–390 **A** 1.  $-\sqrt{2}i$  3.  $1 + 2i$ ;  $x^3 - 5x^2 + 11x - 15 = 0$  5.  $\{1 + 3i, -2, 3\}$  7. a.  
 $(x^2 + 1)(x + 1)$  b.  $(x + i)(x - i)(x + 1)$  9. a.  $(x + 3)\left(x - \frac{3}{2} - \frac{\sqrt{5}}{2}\right)\left(x - \frac{3}{2} + \frac{\sqrt{5}}{2}\right)$  b. same as a.

11. a.  $(x - 2)(x + 3)(x^2 + 2x + 4)$  b.  $(x - 2)(x + 3)(x + 1 - i\sqrt{3})(x + 1 + i\sqrt{3})$

13. zeros:  $-2, 0, 2$  15. zeros:  $0, 2$  17. zeros:  $-3, -1, 2$  19. zeros:  $-2, 0, 2, 4$



B 21. 0.58 23. 1.20

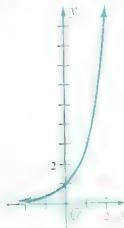
25. 4 27.  $2 + 2\sqrt{3}$

Pages 393 Chapter Test and Review 1. a.  $x = -4$  b.  $(-4, -2)$ , a minimum point c.  $-2$  3.  $37\frac{1}{2}$  ct./gal.  
5.  $-\frac{3}{2}\sqrt{2} + 8\sqrt{2}i$  7. a.  $2 + 3i$  b.  $-4$  9.  $\left\{1 + \frac{\sqrt{2}}{2}i, 1 - \frac{\sqrt{2}}{2}i\right\}$  11.  $\{-3, -\frac{1}{2}, 2\}$  13. 2.09

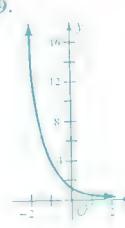
Pages 400–401 A 1.  $3^{\frac{1}{2}}x^{\frac{1}{2}}$  3.  $2x^{\frac{2}{3}}y^{\frac{5}{3}}$  5.  $\frac{2^{\frac{7}{4}}}{x^{\frac{5}{4}}y^{\frac{1}{2}}}$  7.  $\sqrt{3}$  9.  $ab^2\sqrt{3a}$  11.  $\sqrt[6]{\frac{49a}{b^4}}$  13.  $\frac{1}{625}$  15. 40 17. 0.09  
19.  $\frac{1}{64}$  21.  $2^{12}\sqrt{2^{11}}$  23.  $\sqrt[12]{2^{11}}$  25.  $\sqrt{2}$  27.  $\sqrt[4]{2}$  B 29.  $10^{6.3}$  31.  $2^{0.9}$  33.  $\sqrt{3}$  35.  $a^{\frac{35}{18}}$  37.  $\sqrt{a} + \sqrt{b}$   
39.  $t - t^5$  41. {16} 43. {126} 45. {4}

Page 404 A 1. 3 3.  $\frac{1}{625}$  5. 1000 7. 1 9. {3} 11.  $\{-\frac{1}{2}, 1\}$  13.  $\{-2\}$  15.  $\{-2\}$

17.



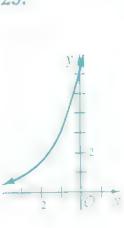
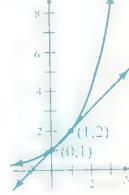
19.



B 21.



23.

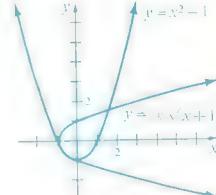
C 25.  $\{(0, 1), (1, 2)\}$ 

Page 407

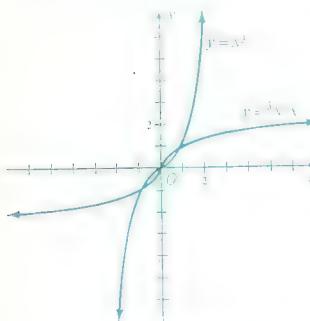
A 1.  $\{(x, y): y = \frac{1}{2}(x + 1)\}; f^{-1}$  is a function.



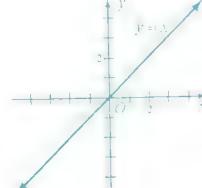
3.  $\{(x, y): y = \pm\sqrt{x + 1}\}; f^{-1}$  is not a function.



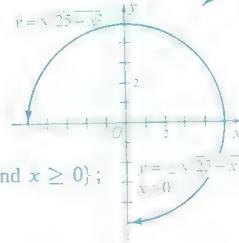
5.  $\{(x, y): y = \sqrt[3]{x}\}; f^{-1}$  is a function.



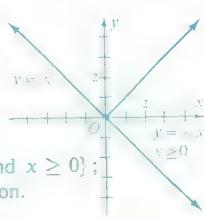
7.  $\{(x, y): y = x^3\}; f^{-1}$  is a function.



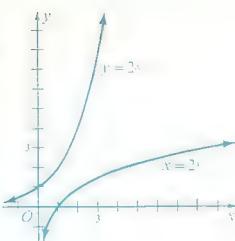
9.  $\{(x, y): y = \pm\sqrt{25 - x^2} \text{ and } x \geq 0\}; f^{-1}$  is not a function.



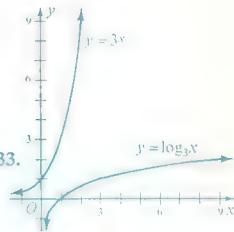
11.  $\{(x, y): y = \pm x \text{ and } x \geq 0\}; f^{-1}$  is not a function.



13.  $\{(x, y) : x = 2^y\}$ ;  $f^{-1}$  is a function.



15.  $\{(x, y) : y = x\}$



Page 410 A 1. -1 3.  $\frac{1}{3}$  5.  $\frac{4}{3}$  7. 2 9. -2 11. 0 13. 3  
 15. 4 17.  $\frac{1}{256}$  19. 1 21. 2 23.  $\frac{3}{4}$  B 25. 4 27. 3 29. 6 31.  $\pm 8$  33. C 41. 100 43. 5

Pages 413-414 A 1.  $7.35 \times 10^1$  3.  $6.54 \times 10^0$  5.  $1.76 \times 10^{-2}$  7.  $7.09 \times 10^{-3}$  9.  $1.237 \times 10^5$   
 11.  $1.2 \times 10^{-5}$  13.  $3.8 \times 10^2$  15. 10,000 17. 0.00001 19. 1230 21. 0.09873 23. 200 25. 0.0016  
 27. 60,000 29. 0.005 31. one one-hundredth of a meter b. 0.005 m. c.  $12\frac{1}{2}\%$  33. a. 10 m. b. 5 m.  
 c. 2% 35. a. one one-hundred-thousandth of a meter b. 0.000005 m. c.  $1\frac{1}{4}\%$  37. a. 1000 m. b. 500 m.  
 c. 0.4%

Page 417 A 1. 1.9661 3. 0.8451 5. 3.5752 7.  $8.3201 - 10$  9.  $9.7924 - 10$  11. 1.7952 13.  
 0.7076 15. 4.7782 17. 27.3 19. 347 21. 2630 23. 94.4 25. 39,000 C 27.  $\{x : x > 2 \text{ or } 0 < x < 1\}$

Page 419 A 1. 0.5112 3. 1.7273 5. 7.8764 - 10 7. 0.4972 9. 9.9383 - 10 11. 4.8020 13. 760.5  
 15. 0.01663 17. 9.806 19. 42,050 21. 0.03475 23. 66.94

Page 423 A 1. 54.9 3. 242 5. 174 7. 0.00015 9. 305 11. -0.079 13. 1.94 15. 3.959 17. 0.7882  
 19. -1.337 21. 1.01 23. 0.47 25. {2} 27. {5} 29.  $\{\frac{3}{2}\}$  31. {-5, 6} B 33. {3} 35. {6}  
 37. {3}

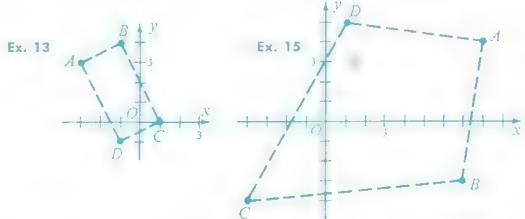
Pages 426-427 A 1. 280 3. 3.88 5. 27.0 7. 0.744 9. 7.76 11.  $8.44 \times 10^{14}$  13. 1.56 15. 0.186  
 17. 796 19. 0.799 21. 8.50 23. 0.0876 25. 44.1 27. 8.73 29. {4.00} 31. {3.00} ■ 33. {1.00, 100}  
 35.  $\{\frac{4}{3}\}$  37.  $\frac{4}{3}\sqrt{195}$  39.  $\pi^e < e^\pi$

Pages 427-428 A 1. \$3620 3. \$1436 5. \$1680 B 7. 4,910,000 bacteria 9. 12.54 hr.

Page 430 A 1. {2.68} 3. {0.742} 5. {507} 7. {0.164} 9. 2.32 11. 0.729 13. 3.17 15. 2.30  
 B 17. {0.75} 19. {0.087} 21. {0.83}

Page 432 Chapter Test and Review 1.  $\frac{4}{9}$  3.  $\{(x, y) : y = \frac{1}{4}x - \frac{1}{2}\}$  5. 300 7. a.  $8.0990 - 10$  b. 40.27  
 9. a. 1.76 b. 2.37

Pages 437-438 A 1. a. 4 b. (1, 5) 3. a. 10 b.  $(-\frac{1}{2}, 1)$  5. a. 10 b. (4, 6) 7. a.  $\sqrt{5}$  b.  $(3\frac{1}{2}, -2)$   
 9. a. 2 b.  $(3\frac{1}{2}, \frac{3}{2}\sqrt{3})$  11. a.  $|b - a|\sqrt{2}$  b.  $\left(\frac{a+b}{2}, \frac{a+b}{2}\right)$  13. a parallelogram (diagram below)  
 15. not a parallelogram (diagram below) 17. a.  $4\sqrt{2} + 2\sqrt{10}$  b. isosceles c. not a rt. triangle 19. a.  
 $3\sqrt{10} + 5\sqrt{2}$  b. not isosceles c. a rt. triangle; area = 10 sq. units 21. a. 48 b. not isosceles c. not a rt.  
 triangle 23. (4, 6) 25. (3, 5) 27.  $|b - a|$  B 29.  $y = 7x - 7$  C 31. (8, 8)

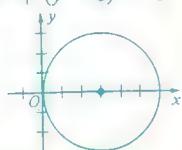
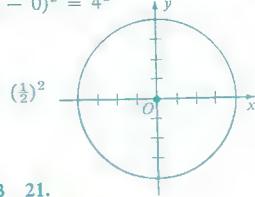
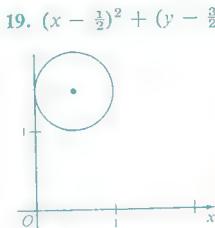
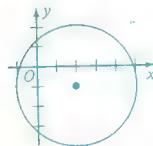


Page 441 A 1. 2 3. 1 5.  $\frac{5}{12}$  9.  $y = \frac{5}{2}x - \frac{19}{2}$  11.  $y = -7x + 46$  B 13.  $y = \frac{1}{3}x + \frac{2}{3}$

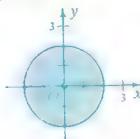
## ANSWERS FOR ODD-NUMBERED EXERCISES

**Pages 443–444 A** 1.  $x^2 + y^2 - 9 = 0$  3.  $x^2 + y^2 - 6x - 2y - 15 = 0$  5.  $x^2 + y^2 - x - \frac{3}{2}y - \frac{3}{16} = 0$  7.  $x^2 + y^2 - 4x + 4y - 4\frac{1}{4} = 0$  9.  $x^2 + y^2 - 6x - 7y + 16\frac{1}{4} = 0$  11.  $x^2 + y^2 - 2hx - 2ky + (h^2 + k^2 - r^2) = 0$  13.  $(x - 0)^2 + (y - 0)^2 = 4^2$  15.  $(x - 3)^2 + (y - 0)^2 = 3^2$

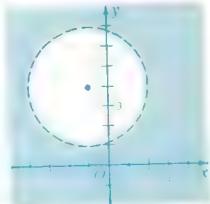
17.  $(x - 2)^2 + (y + 1)^2 = 3^2$



B 21.



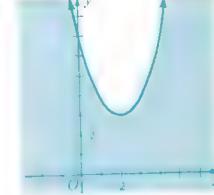
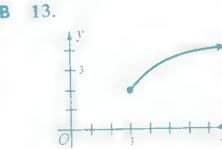
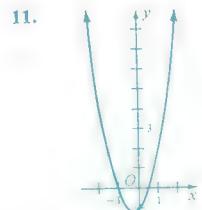
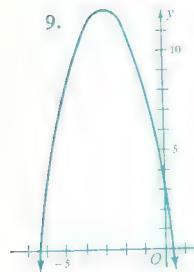
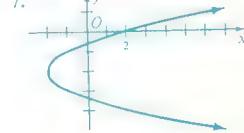
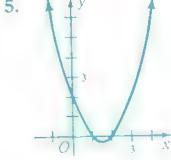
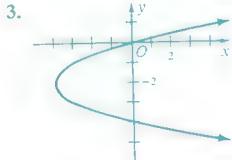
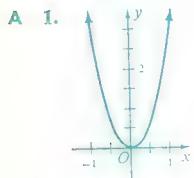
23.



25.  $x^2 + y^2 - 4x - 12y + 3 = 0$

27.  $x^2 + y^2 + 2x + 4y - 12 = 0$  C 29.  $x^2 + y^2 - 8x - 4y - 25 = 0$  31.  $y = -\frac{2}{3}x + 4\frac{1}{3}$

**Pages 448–449**

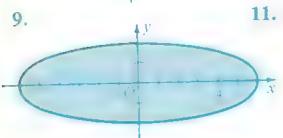
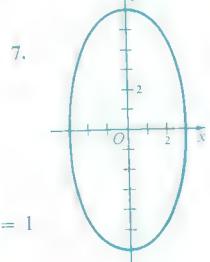
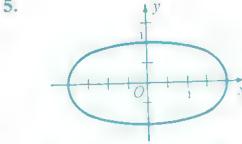
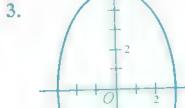
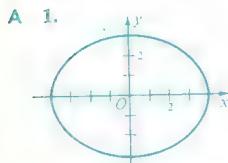


17.  $y = \frac{3}{4}x^2 + 2$

19.  $x = -\frac{1}{16}y^2 + 1$

21.  $y = \frac{1}{8}(x - 2)^2 + 3$

**Pages 452–453**



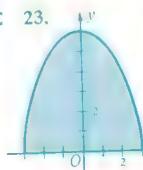
13.  $\frac{x^2}{9} + \frac{y^2}{25} = 1$

B 15.  $\frac{x^2}{25} + \frac{y^2}{9} = 1$

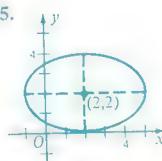
17.  $\frac{x^2}{9} + \frac{y^2}{5} = 1$

19.  $\frac{x^2}{4} + \frac{y^2}{1} = 1$  or  
 $\frac{x^2}{1} + \frac{y^2}{4} = 1$

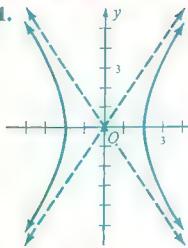
C 23.



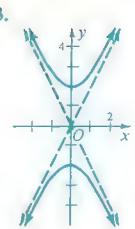
25.



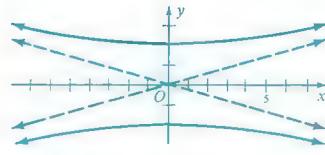
Pages 457–458

**A** 1.

3.



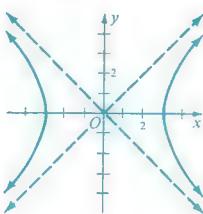
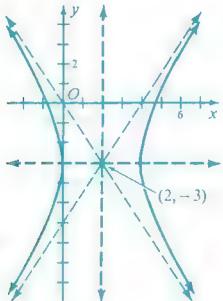
5.



7. equilateral



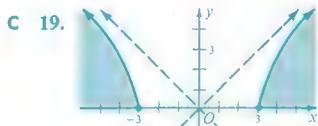
9. equilateral



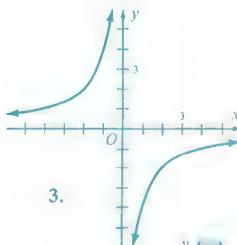
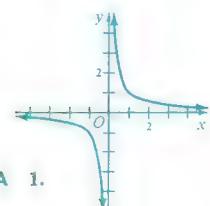
11.  $\frac{x^2}{25} - \frac{y^2}{4} = 1$

B 13.  $\frac{y^2}{9} - \frac{x^2}{7} = 1$

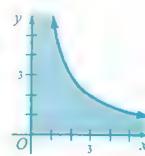
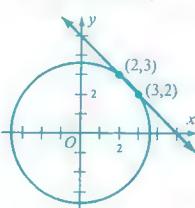
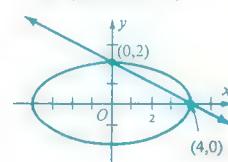
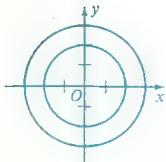
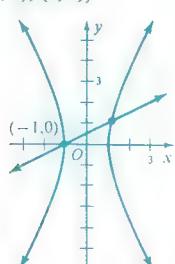
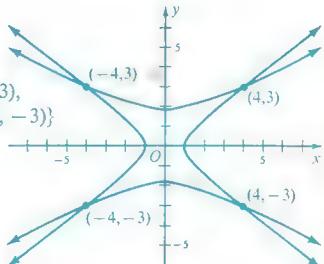
15.  $\frac{y^2}{16} - \frac{x^2}{20} = 1$



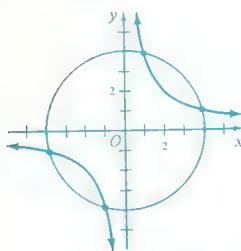
21.

Pages 461–462 **A** 1.11. 3, -3 13. 144 15.  $\frac{3}{2}$  **B** 17. 6 19.  $y$  is halved

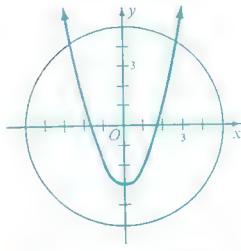
5. 4 7. -4 9. 9, -9

C 23.  $xy = 2$ Pages 462–463 **A** 1.  $\frac{1}{2}$  amps 3. 90 r.p.m. 5.  $416\frac{2}{3}$  ohms  $\doteq 420$  ohms **B** 7. 160 tonsPages 464–465 **A** 1.  $\{(0, 0), (2, 2)\}$ 3.  $\{(2, 3), (3, 2)\}$ 5.  $\{(0, 2), (4, 0)\}$ 7.  $\emptyset$ 9.  $\{(-1, 0), (1, 1)\}$ 11.  $\{(4, 3), (4, -3), (-4, 3), (-4, -3)\}$ 

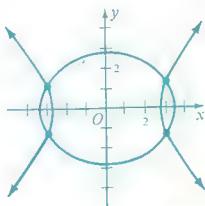
**B** 13.  $\{(1, 4), (4, 1), (-1, -4), (-4, -1)\}$



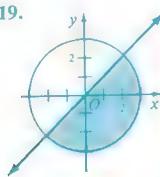
15.  $\{(-2\frac{1}{2}, 4), (2\frac{1}{2}, 4)\}$



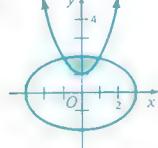
17.  $\{(-3, 1\frac{1}{2}), (-3, -1\frac{1}{2}), (3, 1\frac{1}{2}), (3, -1\frac{1}{2})\}$



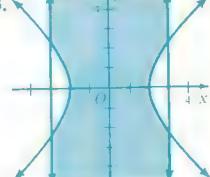
19.



21.



23.



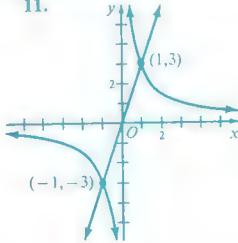
Pages 466–467 **A** 1.  $\{(3 + \sqrt{6}i, 3 - \sqrt{6}i), (3 - \sqrt{6}i, 3 + \sqrt{6}i)\}$  3.  $\{(-4, -\frac{3}{2}), (3, 2)\}$  5.  $\{(-\frac{2}{5}, 2\frac{1}{5}), (1, -2)\}$  7.  $\{(4, 3)\}$  9.  $\{(6, 0), (0, -3)\}$  11.  $\{(1, \frac{1}{2}), (-\frac{1}{2}, -1)\}$  **B** 13.  $\{(-5, 12), (3, -4)\}$  15.  $\{(1 + \sqrt{3}, 2 - \sqrt{3}), (1 - \sqrt{3}, 2 + \sqrt{3})\}$  17.  $\{(1 + 3i, 3i), (1 - 3i, -3i)\}$  19.  $\{(3, 12)\}$  21.  $\{(\frac{1}{4}, -1), (\frac{3}{4}, -\frac{2}{3})\}$  23.  $\{(1, 5)\}$  25.  $\left\{(1, 1), \left(\frac{a}{b}, \frac{b}{a}\right)\right\}$

Pages 467–468 **A** 1. 9 in., 16 in. 3. 6, 12 5. 5, 7 7. 6 units, 9 units

Pages 469–470 **A** 1.  $\{(1, 0), (2, 5)\}$  3.  $\{\left(\frac{3}{2}, 2\right), \left(-\frac{3}{2}, 2\right), (1, -3), (-1, -3)\}$  5.  $\{(2, 3), (2, -3), (-2, 3), (-2, -3)\}$  7.  $\{(3, 4), (3, -4), (-3, 4), (-3, -4)\}$  9.  $\{(2, 2), (-2, -2)\}$  11.  $\{(3, 6), (-3, 6), (3, -6), (-3, -6)\}$  **B** 13.  $\{\left(\frac{1}{2}, \frac{3}{2}\right), \left(-\frac{1}{2}, \frac{3}{2}\right), \left(\frac{1}{2}, -\frac{3}{2}\right), \left(-\frac{1}{2}, -\frac{3}{2}\right)\}$  15.  $\{(0, 3), (0, -3), (\frac{2\sqrt{5}}{3}, 4i), (\frac{2\sqrt{5}}{3}, -4i)\}$  17.  $\{(1, 3), (\frac{3}{2}, 2)\}$  19.  $\{(-6, -4), (8, 3)\}$  **C** 21.  $\{(a, a - b), (a, b - a), (-a, a - b), (-a, b - a)\}$

Pages 470–471 **A** 1. 7, 5 3. 25 ft., 60 ft. 5. 75 suits; \$50 7. insolvable **B** 9.  $\frac{16x^2}{27(27 + \sqrt{697})} + \frac{y^2}{6(27 - \sqrt{697})} = 1$  or  $\frac{16x^2}{27(27 - \sqrt{697})} + \frac{y^2}{6(27 + \sqrt{697})} = 1$

Page 473 Chapter Test and Review 1. a.  $2\sqrt{13}$  b.  $2\sqrt{41}$  3. center =  $(-3, 4)$ , radius = 6 5. a. neither; The axis of the graph is the  $y$ -axis. b. neither; The axis of the graph is the  $x$ -axis. c.  $y$ -axis 7.  $x$ -intercepts: 5, -5;  $y$ -intercepts: 2, -2 9. a.  $\frac{3}{2}$  b. 16 11.  $(-2\sqrt{3}, 3\sqrt{2}), (-2\sqrt{3}, -3\sqrt{2})$



13.  $\{(2\sqrt{3}, 3\sqrt{2}), (2\sqrt{3}, -3\sqrt{2})\}$

Pages 474–475 Cumulative Review

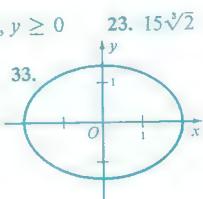
1. comm. ax. of add. 3.  $1\frac{1}{2}$  5.  $\sum_{k=1}^6 2k + 1$  7. 17 9.  $y = 2x + 8$

11.  $\{(1, 3, -1)\}$  13.  $-27x^8y^5$  15.  $2x^3 - 7x^2 + 13x - 5$  17.  $\frac{x - 2}{2x + 1}$

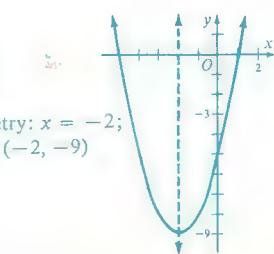
19.  $\frac{1}{2y + 1}$  21.  $xy\sqrt[3]{3xy^3}, x \geq 0, y \geq 0$

27.  $-i$  29.  $\sqrt[3]{x^2y^2}$  31. {20}

35.  $\{(\frac{5}{2}\sqrt{5}i, 6), (\frac{5}{2}\sqrt{5}i, -6), (-\frac{5}{2}\sqrt{5}i, 6), (-\frac{5}{2}\sqrt{5}i, -6)\}$

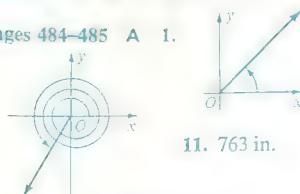


37. 20 oz.



**Page 478** A 1. a. 17 b. 18 c. 164 3. a.  $3\frac{9}{13}$  b.  $\frac{1+\sqrt{5}}{2}$  c.  $\sqrt{2}$  d.  $\sqrt{11}$

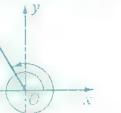
**Pages 484–485** A 1.



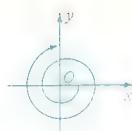
3.



5.



7.



9.

11.

11. 763 in.

13.

13. 649 cm.

15.

15. 308 ft.

17.

17. 3 ft.

19.

19.  $4\frac{2}{3}$  ft.

■

21. 1.9 ft.

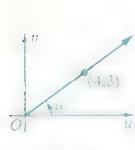
23. 1174 ft. C 25. 58.6 ft/sec.

**Page 489** A 1.  $\frac{5\pi^R}{6}$  3.  $-\frac{\pi^R}{2}$  5.  $-\frac{\pi^R}{6}$  7.  $\frac{2\pi^R}{3}$  9.  $-\frac{5\pi^R}{3}$  11.  $30^\circ$  13.  $-135^\circ$  15.  $225^\circ$

17.  $300^\circ$  19.  $-105^\circ$  21. 37.68 ft. 23. 58.61 yd. 25. 113.04 mi. 27. 1123.34 ft. 29. 33.75° 31.  $40^\circ$

33.  $1080^\circ$

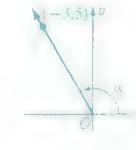
**Pages 493–494** A 1.  $\sin \alpha = \frac{3}{5}$ ,  $\cos \alpha = \frac{4}{5}$  (diagram below) 3.  $\sin \alpha = \frac{\sqrt{2}}{2}$ ,  $\cos \alpha = \frac{\sqrt{2}}{2}$  (diagram below) 5.  $\sin \alpha = \frac{5\sqrt{34}}{34}$ ,  $\cos \alpha = -\frac{3\sqrt{34}}{34}$  (diagram below) 7.  $\sin \alpha = \frac{5\sqrt{29}}{29}$ ,  $\cos \alpha = \frac{2\sqrt{29}}{29}$  (diagram below) 9.  $\sin \alpha = -\frac{3}{5}$ ,  $\cos \alpha = -\frac{4}{5}$  (diagram below) 11.  $\sin \alpha = \frac{\sqrt{3}}{2}$ ,  $\cos \alpha = -\frac{1}{2}$  (diagram below) 13.  $\sin \alpha = \frac{4}{5}$ ; I 15.  $\cos \alpha = -\frac{1}{\sqrt{2}}$ ; II 17.  $\cos \alpha = \frac{5}{13}$ ; IV 19.  $\sin \alpha = -\frac{2\sqrt{5}}{5}$ ; IV B 21.  $\sin \alpha = \frac{4}{5}$ ,  $\cos \alpha = \frac{3}{5}$  23.  $\sin \alpha = \frac{12}{13}$ ,  $\cos \alpha = \frac{5}{13}$  25.  $\sin \alpha = -\frac{15}{17}$ ,  $\cos \alpha = -\frac{8}{17}$



Ex. 1



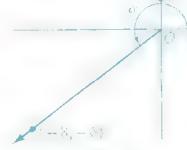
Ex. 3



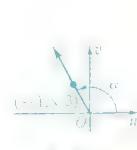
Ex. 5



Ex. 7



Ex. 9

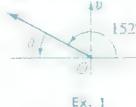


Ex. 11

**Page 498** A 1.  $\frac{\sqrt{3}}{2}$  3.  $\frac{\sqrt{2}}{2}$  5. 1 7.  $-\frac{1}{2}$  9.  $\frac{1}{2}$  11.  $\frac{\sqrt{2}}{2}$  13.  $-\frac{1}{2}$  15.  $\frac{\sqrt{2}}{2}$

**Page 502** A 1. 0.3228 3. 0.7092 5. 0.6465 7. 0.8705 9. 0.6435 11. 0.6977 13. 0.0052  
15. 0.6388 17.  $38^\circ 20'$  19.  $14^\circ 30'$  21.  $31^\circ 25'$  23.  $54^\circ 06'$  25.  $3^\circ 45'$  27.  $44^\circ 55'$  29. 0.2288 31. 0.7833  
33. 0.9376 35. 0.8463 37. 0.9330 39. 0.9888 41. 0.765 43. 0.775 45. 0.932 47. 0.186 49. 1.564  
51. 0.022

**Pages 505–506** A 1.  $\sin 152^\circ = \sin 28^\circ$  (diagram below) 3.  $\sin 219^\circ = -\sin 39^\circ$  (diagram below)  
5.  $\cos 311^\circ = \cos 49^\circ$  (diagram below) 7.  $\cos 151^\circ 10' = -\cos 28^\circ 50'$  (diagram below) 9.  $\cos 197^\circ 50' = -\cos 17^\circ 50'$  (diagram below) 11.  $\cos 299^\circ 20' = \cos 60^\circ 40'$  (diagram below) 13.  $\sin 2.00^\circ = \sin 1.14^\circ$  (diagram below) 15.  $\sin(-1)^\circ = -\sin 1^\circ$  (diagram below) 17. 0.4695 19.  $-0.6293$   
21. 0.6561 23.  $-0.8760$  25.  $-0.9520$  27. 0.4899 29. 0.9086 31.  $-0.8415$  33.  $-0.8829$  35. 0.8192  
37.  $-0.9086$  39.  $-0.8866$  41. 0.9902 43.  $-0.5480$  45.  $125^\circ 40'$  47.  $199^\circ 40'$  49.  $296^\circ 50'$   
51.  $180^\circ 30'$  53.  $-2.672$



Ex. 1



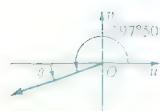
Ex. 3



Ex. 5



Ex. 7



Ex. 9



Ex. 11

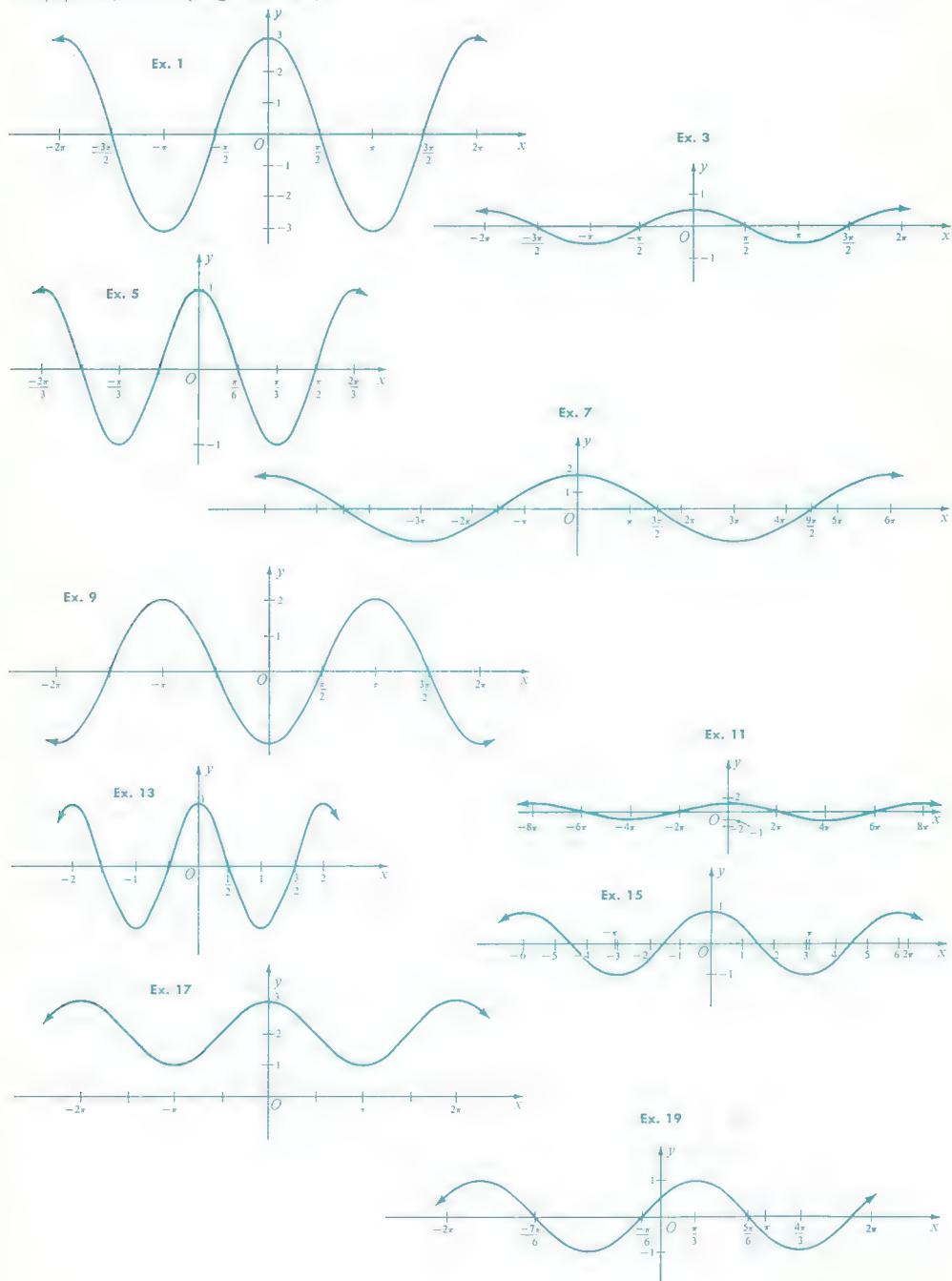


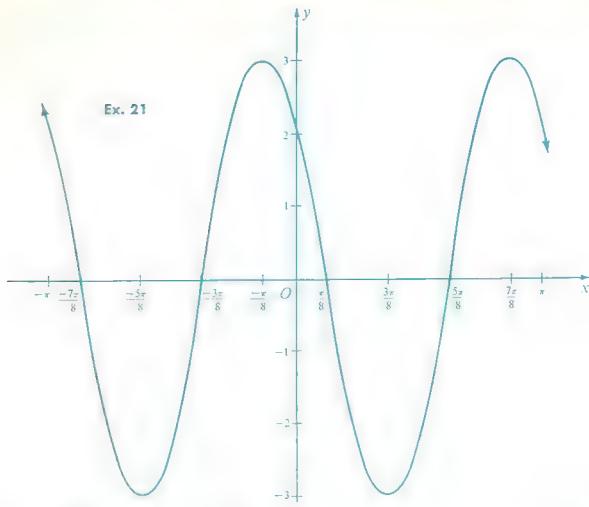
Ex. 13



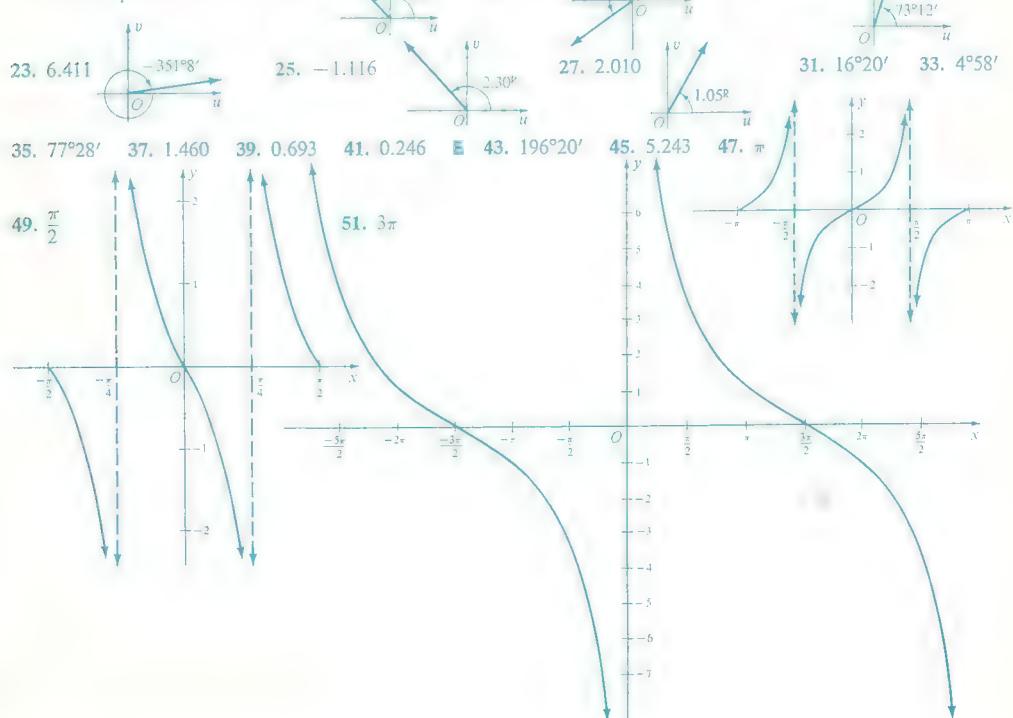
Ex. 15

**Page 512 A** 1.  $|A| = 3$ ;  $P = 2\pi$  (diagram below) 3.  $|A| = \frac{1}{2}$ ;  $P = 2\pi$  (diagram below) 5.  $|A| = 1$ ;  $P = \frac{2\pi}{3}$  (diagram below) 7.  $|A| = 2$ ;  $P = 6\pi$  (diagram below) 9.  $|A| = 2$ ;  $P = 2\pi$  (diagram below) 11.  $|A| = 1$ ;  $P = 8\pi$  (diagram below) **B** 13.  $|A| = 1$ ;  $P = 2$  (diagram below) 15.  $|A| = 1$ ;  $P = 6$  (diagram below) 17.  $|A| = 1$ ;  $P = 2\pi$  (diagram below) **C** 19.  $|A| = 1$ ;  $P = 2\pi$  (diagram below) 21.  $|A| = 3$ ;  $P = \pi$  (diagram below)

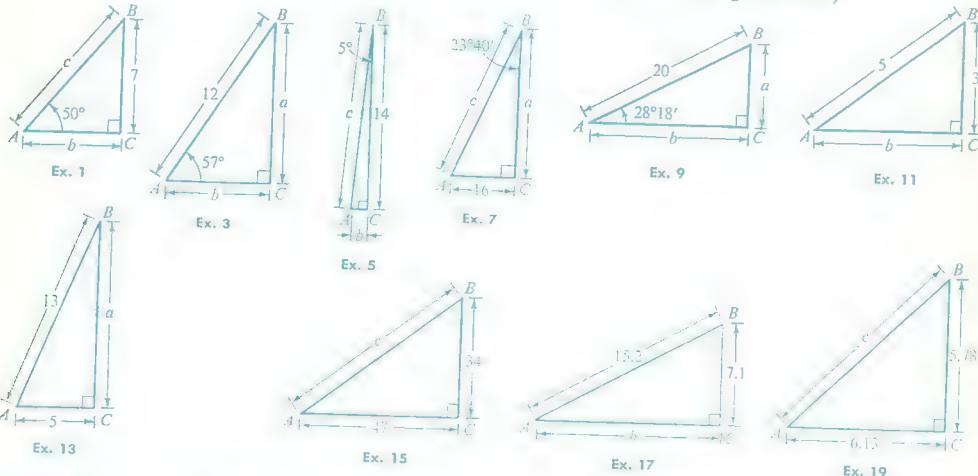




**Pages 516–517 A** 1.  $\sin \alpha = \frac{\sqrt{2}}{2}$ ;  $\cos \alpha = \frac{\sqrt{2}}{2}$ ;  $\tan \alpha = 1$ ;  $\cot \alpha = 1$ ;  $\sec \alpha = \sqrt{2}$ ;  $\csc \alpha = \sqrt{2}$   
 3.  $\sin \alpha = \frac{6\sqrt{37}}{37}$ ;  $\cos \alpha = -\frac{\sqrt{37}}{37}$ ;  $\tan \alpha = -6$ ;  $\cot \alpha = -\frac{1}{6}$ ;  $\sec \alpha = -\sqrt{37}$ ;  $\csc \alpha = \frac{\sqrt{37}}{6}$  5.  $\sin \alpha = \frac{5\sqrt{34}}{34}$ ;  $\cos \alpha = -\frac{3\sqrt{34}}{34}$ ;  $\tan \alpha = -\frac{5}{3}$ ;  $\cot \alpha = -\frac{3}{5}$ ;  $\sec \alpha = -\frac{\sqrt{34}}{3}$ ;  $\csc \alpha = \frac{\sqrt{34}}{5}$  7.  $\sin \alpha = -1$ ;  $\cos \alpha = 0$ ;  $\tan \alpha$  is undefined;  $\cot \alpha = 0$ ;  $\sec \alpha$  is undefined;  $\csc \alpha = -1$  9.  $\tan 30^\circ = \frac{\sqrt{3}}{3}$ ;  $\cot 30^\circ = \sqrt{3}$ ;  $\sec 30^\circ = \frac{2\sqrt{3}}{3}$ ;  $\csc 30^\circ = 2$  11.  $\tan 135^\circ = -1$ ;  $\cot 135^\circ = -1$ ;  $\sec 135^\circ = -\sqrt{2}$ ;  $\csc 135^\circ = \sqrt{2}$   
 13.  $\tan \frac{\pi^R}{3} = \sqrt{3}$ ;  $\cot \frac{\pi^R}{3} = \frac{\sqrt{3}}{3}$ ;  $\sec \frac{\pi^R}{3} = 2$ ;  $\csc \frac{\pi^R}{3} = \frac{2\sqrt{3}}{3}$  15.  $\tan \frac{3\pi^R}{4} = -1$ ;  $\cot \frac{3\pi^R}{4} = -1$ ;  $\sec \frac{3\pi^R}{4} = -\sqrt{2}$ ;  $\csc \frac{3\pi^R}{4} = \sqrt{2}$  17.  $-1.036$  19.  $-1.228$  21.  $3.460$   
 23.  $6.411$  25.  $-1.116$  27.  $2.010$  31.  $16^\circ 20'$  33.  $4^\circ 58'$



**Page 521 A** 1.  $m(B) = 40^\circ$ ;  $b \approx 5.874$ ;  $c \approx 9.135$  (diagram below) 3.  $m(B) = 33^\circ$ ;  $a \approx 10.06$ ;  $b \approx 6.535$  (diagram below) 5.  $m(A) = 85^\circ$ ;  $b \approx 1.225$ ;  $c \approx 14.06$  (diagram below) 7.  $m(A) = 66^\circ 20'$ ;  $a \approx 36.51$ ;  $c \approx 39.86$  (diagram below) 9.  $m(B) = 61^\circ 42'$ ;  $a \approx 9.482$ ;  $b \approx 17.61$  (diagram below) 11.  $m(A) \approx 36^\circ 52'$ ;  $m(B) \approx 53^\circ 8'$ ;  $b \approx 4.000$  (diagram below) 13.  $m(A) \approx 67^\circ 24'$ ;  $m(B) \approx 22^\circ 33'$ ;  $a \approx 12.00$  (diagram below) 15.  $m(A) \approx 35^\circ 53'$ ;  $m(B) \approx 54^\circ 7'$ ;  $c \approx 58.00$  (diagram below) 17.  $m(A) \approx 27^\circ 51'$ ;  $m(B) \approx 62^\circ 9'$ ;  $b \approx 13.44$  (diagram below) 19.  $m(A) \approx 43^\circ 19'$ ;  $m(B) \approx 46^\circ 41'$ ;  $c \approx 8.421$  (diagram below)

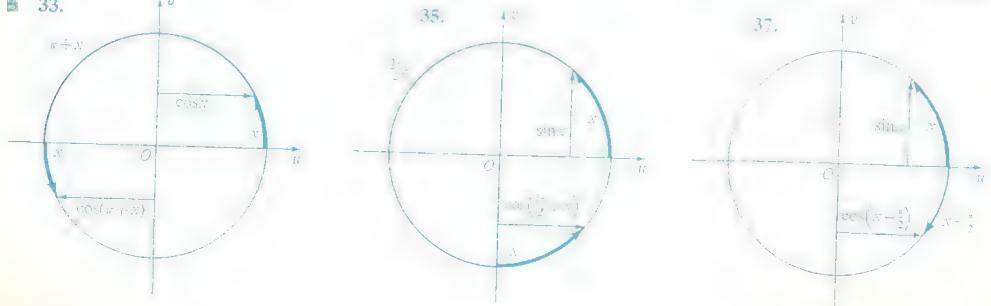


**Pages 521–523 A** 1. 167.8 ft. 3. 195.4 ft. 5.  $77^\circ 33'$  7. 5.815 nautical mi. **B** 9. 62.05 yd.  
11. 7.656 mi.

**Page 525 Chapter Test and Review** 1. 1232 cm. 3.  $\frac{25\pi}{3}$  ft. 5.  $\frac{3\sqrt{13}}{13}$ : IV 7.  $\frac{\sqrt{3}}{2}$  9. 0.562 11. 1.44  
13.  $\tan \alpha = \frac{\sqrt{15}}{15}$ ;  $\cot \alpha = \sqrt{15}$ ;  $\sec \alpha = \frac{4\sqrt{15}}{15}$ ;  $\csc \alpha = 4$  15. 4768 ft.

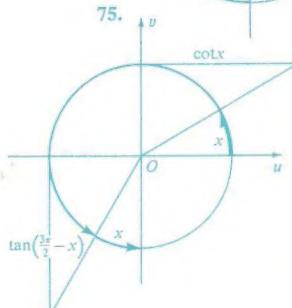
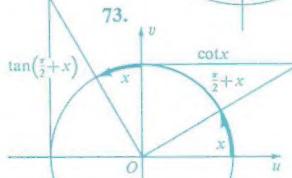
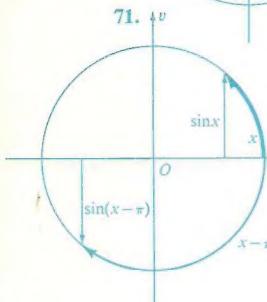
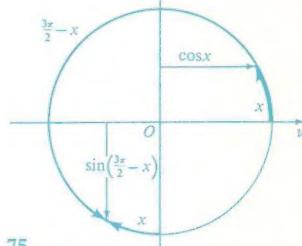
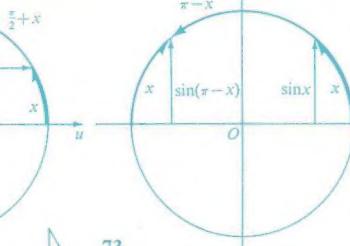
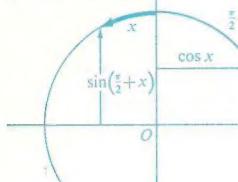
**Pages 529–530 A** 1.  $\frac{1 - \sin^2 \alpha}{\sin \alpha}$ ;  $\sin \alpha \neq 0$ ,  $\cos \alpha \neq 0$  3.  $\sin^2 \alpha$ ;  $\cos \alpha \neq 0$  5.  $1 + \frac{1}{\tan^2 \alpha}$ ;  $\sin \alpha \neq 0$ ,  $\cos \alpha \neq 0$  7.  $1 - \frac{1}{\csc^2 \alpha}$ ;  $\sin \alpha \neq 0$  9.  $\frac{1}{\sin^2 \alpha} - 1$ ;  $\sin \alpha \neq 0$  11.  $\sin \alpha = \frac{\tan \alpha \sqrt{\tan^2 \alpha + 1}}{\tan^2 \alpha + 1}$ ,  $\cos \alpha \neq 0$ , if  $\alpha$  lies in Quadrants I or IV;  $\sin \alpha = -\frac{\tan \alpha \sqrt{\tan^2 \alpha + 1}}{\tan^2 \alpha + 1}$ ,  $\cos \alpha \neq 0$ , if  $\alpha$  lies in Quadrants II or III. 13.  $\cos \alpha$ ;  $\sin \alpha \neq 0$  15.  $\csc x$ ;  $\sin x \neq 0$  17.  $-1$ ;  $\sin x \neq 0$ ,  $\cos x \neq 0$  **B** 19.  $\frac{1}{\cos \alpha}$  21.  $\sin \alpha$  23. 1  
25. a.  $-\frac{\sin \alpha \sqrt{1 - \sin^2 \alpha}}{1 - \sin^2 \alpha}$  b.  $-\frac{\sqrt{1 - \sin^2 \alpha}}{\sin \alpha}$  c.  $-\frac{\sqrt{1 - \sin^2 \alpha}}{1 - \sin^2 \alpha}$  d.  $\frac{1}{\sin \alpha}$

**Pages 540–542 A** 1.  $-\frac{\sqrt{3}}{2}$  3.  $\frac{1}{2}$  5. 0 7.  $-\frac{1}{2}$  9.  $-\frac{\sqrt{2}}{2}$  11.  $-\frac{\sqrt{3}}{2}$  13.  $\frac{\sqrt{3}}{2}$  15.  $-\frac{1}{2}$  17.  $\sin \frac{\pi}{5}$   
19.  $-\cos \frac{\pi}{5}$  21.  $\sin \frac{\pi}{8}$  23.  $-\cos 0.1\pi$  25.  $-\cos 27^\circ$  27.  $-\cos 41^\circ$  29.  $-\sin 27^\circ 10'$  31.  $-\sin 24^\circ$   
**B** 33.



39. 1    41.  $\frac{-\sqrt{2} - \sqrt{6}}{4}$     43.  $-\frac{1}{2}$     45.  $\frac{63}{65}$     47.  $\frac{33}{65}$     49.  $\frac{3}{5}$     51.  $\frac{17\sqrt{2}}{26}$

Pages 547-549 A 1.  $\cos \frac{2\pi}{9}$  3.  $\cos \frac{\pi}{5}$  5.  $-\sin 0.1\pi$  7.  $\sin \frac{\pi}{10}$  9.  $-\cos \frac{2\pi}{11}$  11.  $\sin \frac{\pi}{10}$  13.  $\cos 33^\circ$   
 15.  $-\sin 20^\circ$  17.  $\sin 10^\circ$  19.  $-\cos 25^\circ$  21.  $-\sin 18^\circ 10'$  23.  $-\cos 8^\circ$  25.  $-\frac{\sqrt{2}}{2}$  27. -1 29.  $-\frac{\sqrt{2}}{2}$   
 31.  $-\frac{\sqrt{3}}{2}$  33.  $-\frac{1}{2}$  35.  $\frac{\sqrt{2}}{2}$  37.  $-\frac{1}{2}$  39.  $\frac{1}{2}$  41.  $-2 - \sqrt{3}$  43.  $2 + \sqrt{3}$  45.  $-2 + \sqrt{3}$  47.  $2 - \sqrt{3}$   
 49.  $2 + \sqrt{3}$  51.  $2 + \sqrt{3}$  53.  $\sqrt{6} - \sqrt{2}$  55.  $2 - \sqrt{3}$  57.  $\sqrt{2} + \sqrt{6}$  59.  $2 - \sqrt{3}$  61.  $\sqrt{6} + \sqrt{2}$   
 63.  $\sqrt{2} + \sqrt{6}$  B 65. 67. 69.



77.  $\frac{\sqrt{3}}{2}$  79.  $\frac{\sqrt{3}}{2}$  81. 1 83.  $\frac{\sqrt{3}}{3}$

Pages 554-555 A 1.  $\frac{1}{2}$  3.  $\frac{\sqrt{3}}{3}$  5.  $\frac{\sqrt{3}}{2}$  7.  $-\frac{\sqrt{3}}{4}$  9.  $\frac{24}{25}$  11.  $-\frac{24}{25}$  13.  $-\frac{36}{625}$  15.  $\frac{\sqrt{3}}{2}$  17.  $-\frac{1}{2}$

19. -0.1700 21. 0.4536 23.  $\frac{\sqrt{10}}{10}$  25. 3 27.  $\sqrt{10}$  29.  $\sqrt{\frac{1}{2} + \frac{\sqrt{10}}{20}}$

Page 558 A 1. 2.5 3. 56.0 5. 13.4 B 7.  $m(A) \doteq 37^\circ$ ,  $m(B) \doteq 101^\circ$ ,  $m(C) \doteq 42^\circ$  9.  $m(A) \doteq 27^\circ$ ,  
 $m(B) \doteq 113^\circ$ ,  $c \doteq 14$

Page 559 A 1. 799.8 ft. 3. 58.6 naut. mi. 5. 469.7 mi. B 7.  $38^\circ 10'$  9.  $40^\circ 50'$

Page 563 A 1.  $m(A) \doteq 25^\circ 10'$ ,  $m(C) \doteq 109^\circ 50'$ ,  $c = 33.3$  3.  $m(B) \doteq 108^\circ 10'$ ,  $m(C) \doteq 41^\circ 50'$ ,  $b \doteq 28.5$  or  $m(B) \doteq 11^\circ 50'$ ,  $m(C) \doteq 138^\circ 10'$ ,  $b \doteq 6.2$  5.  $m(C) = 75^\circ$ ,  $b \doteq 12.2$ ,  $c \doteq 13.7$  7.  $m(B) \doteq 68^\circ 20'$ ,  $m(C) \doteq 54^\circ 00'$ ,  $c \doteq 19.1$  or  $m(B) \doteq 111^\circ 40'$ ,  $m(C) \doteq 10^\circ 40'$ ,  $c \doteq 4.4$  9.  $m(A) \doteq 26^\circ 20'$ ,  $m(B) \doteq 36^\circ 20'$ ,  $m(C) \doteq 117^\circ 20'$  11. 176.4 sq. units 13. if  $m(B) \doteq 108^\circ 10'$ , area is 142.5 sq. units; if  $m(B) \doteq 11^\circ 50'$ , area is 30.8 sq. units 15. 59.3 sq. units 17. if  $m(C) \doteq 54^\circ 00'$ , area is 178.0 sq. units; if  $m(C) \doteq 10^\circ 40'$ , area is 40.7 sq. units

Pages 564-565 A 1. 45.4 3. 45.9 mi. 5. 362.8 ft. 7. 2695.1 ft. 9. 0.8 hr.

Pages 566-567 Chapter Test and Review 1.  $\frac{1}{1 - \cos^2 \theta}$  3.  $-\cos 27^\circ$  5. a.  $-\frac{24}{25}$  b.  $\frac{\sqrt{10}}{10}$  7. c  $\doteq 8.7$   
 9. 70 sq. units

Pages 574-575 A 1.  $\{y: y = 0 + 2k\pi\} \cup \{y: y = \pi + 2k\pi\}$  3.  $\left\{z: z = \frac{\pi}{6} + k\pi\right\}$  5.  $\{z: z \doteq 0.42 + 2k\pi\} \cup \{z: z \doteq \pi - 0.42 + 2k\pi\}$  7.  $\{\alpha: m^\circ(\alpha) = 30 + 360 \cdot k\} \cup \{\alpha: m^\circ(\alpha) = 330 + 360 \cdot k\}$   
 9.  $\{\alpha: m(\alpha) \doteq 130^\circ 50' + k \cdot 180^\circ\}$  11.  $\{\alpha: m(\alpha) = 30^\circ 20' + k \cdot 360^\circ\} \cup \{\alpha: m(\alpha) = 149^\circ 40' + k \cdot 360^\circ\}$   
 13.  $\frac{\pi}{2}, 90^\circ$  15.  $-\frac{\pi}{6}, -30^\circ$  17.  $\frac{\pi}{3}, 60^\circ$  19. 0.3374,  $19^\circ 20'$  21. -0.6312,  $-36^\circ 10'$  23. 1.2857,  $73^\circ 40'$

Glen William

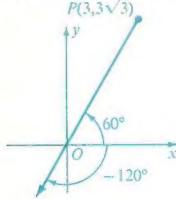
25.  $\frac{\sqrt{2}}{2}$     27. 0    29.  $-\frac{3}{5}$     31.  $60^\circ, \frac{\pi}{3}$     33.  $30^\circ, \frac{\pi}{6}$     35. 0.14,  $8^\circ 01'$     B 37.  $\frac{\sqrt{6} + \sqrt{2}}{4}$     39. 0.9899

41.  $2a\sqrt{1 - a^2}$     43. -9.010

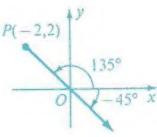
Page 579 A 1. a.  $\{x: x = 0 + 2k\pi\}$  b.  $\{\alpha: m(\alpha) = k \cdot 360^\circ\}$  3. a.  $\left\{x: x = \frac{\pi}{3} + 2k\pi\right\} \cup \left\{x: x = \frac{5\pi}{3} + 2k\pi\right\}$  b.  $\{\alpha: m(\alpha) = 60^\circ + k \cdot 360^\circ\} \cup \{\alpha: m(\alpha) = 300^\circ + k \cdot 360^\circ\}$  7. a.  $\left\{x: x = \frac{\pi}{3} + 2k\pi\right\} \cup \left\{x: x = \frac{5\pi}{3} + 2k\pi\right\} \cup \left\{x: x = \frac{2\pi}{3} + 2k\pi\right\} \cup \left\{x: x = \frac{4\pi}{3} + 2k\pi\right\}$  b.  $\{\alpha: m(\alpha) = 60^\circ + k \cdot 360^\circ\} \cup \{\alpha: m(\alpha) = 300^\circ + 2k\pi\} \cup \{\alpha: m(\alpha) = 120^\circ + 360^\circ \cdot k\} \cup \{\alpha: m(\alpha) = 240^\circ + k \cdot 360^\circ\}$  9.  $\left\{\frac{7\pi}{6}, \frac{11\pi}{6}\right\}$  11.  $\left\{\frac{7\pi}{6}, \frac{3\pi}{2}, \frac{11\pi}{6}\right\}$  13.  $\left\{\frac{\pi}{3}, \frac{3\pi}{4}, \frac{5\pi}{3}, \frac{7\pi}{4}\right\}$  15.  $\left\{\frac{\pi}{6}, \frac{\pi}{3}, \frac{7\pi}{6}, \frac{4\pi}{3}\right\}$  17.  $\{0^\circ, 45^\circ, 90^\circ, 135^\circ, 225^\circ, 270^\circ, 315^\circ\}$  19.  $\{0, \pi, 2.0333, 5.1749\}$  21.  $\{45^\circ, 60^\circ, 120^\circ, 135^\circ, 225^\circ, 240^\circ, 300^\circ, 315^\circ\}$  23.  $\left\{\frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}\right\}$  25.  $\left\{\frac{7\pi}{6}, \frac{11\pi}{6}\right\}$  B 27.  $\{x: 0 \leq x \leq 2\pi\}$  29.  $\left\{\frac{3\pi}{2}\right\}$  31.  $\{60^\circ, 300^\circ, 180^\circ\}$  33.  $\{12^\circ 17', 132^\circ 17', 252^\circ 17'\}$  35.  $\{1\}$  37.  $\left\{x: 0 < x < \frac{\pi}{2}\right\} \cup \left\{x: \pi \leq x \leq \frac{3\pi}{2}\right\}$  39.  $\{x: 0 \leq x \leq \pi\}$  41.  $\{0, 4.07\}$  43.  $\left\{0, \frac{\pi}{3}, \frac{\pi}{2}, \pi, \frac{3\pi}{2}, \frac{5\pi}{3}\right\}$  45.  $\{0^\circ, 90^\circ, 120^\circ, 180^\circ, 240^\circ, 270^\circ\}$

Pages 583-584 A 1.  $(6, 60^\circ), (-6, -120^\circ)$  (diagram below) 3.  $(2\sqrt{2}, 135^\circ), (-2\sqrt{2}, -45^\circ)$  (diagram below) 5.  $(5, 120^\circ), (-5, -60^\circ)$  (diagram below) 7.  $(5, -53^\circ 10'), (-5, 126^\circ 50')$  (diagram below) 9.  $(-2, 2\sqrt{3})$  11.  $(-3, 0)$  13.  $(-\frac{5}{2}\sqrt{3}, -\frac{5}{2})$  15.  $(0, 4)$  17.  $r = 5$ ,  $r = -5$  19.  $0 = r(r + 2 \cos \theta)$

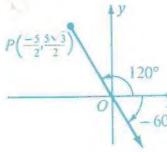
Ex. 1



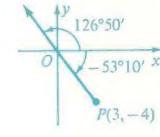
Ex. 3



Ex. 5

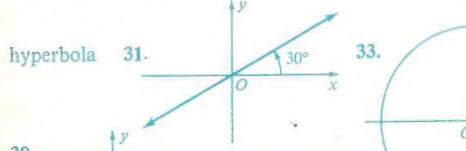


Ex. 7

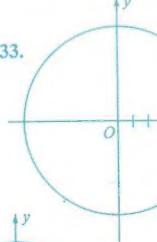


21.  $r(8 \cos \theta - r \sin^2 \theta) = 0$  23.  $r(\cos \theta + \sin \theta) - 3 = 0$  25.  $x^2 + y^2 = 64$ ; circle with radius 8 and center  $(0, 0)$  27.  $x^2 + (y - 1)^2 = 1$ ; circle with radius 1 and center  $(0, 1)$  29.  $\frac{(x + \frac{32}{6})^2}{(\frac{3}{8})^2} - \frac{y^2}{(\frac{8}{\sqrt{3}})^2} = 1$ ;

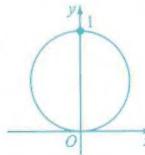
hyperbola 31.



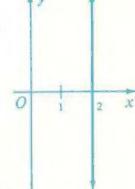
33.



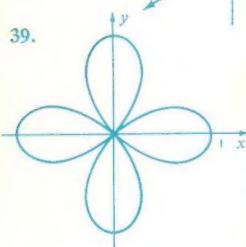
35.



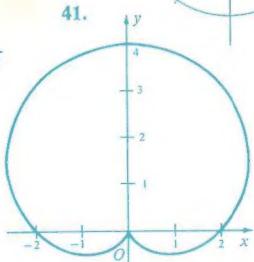
37.



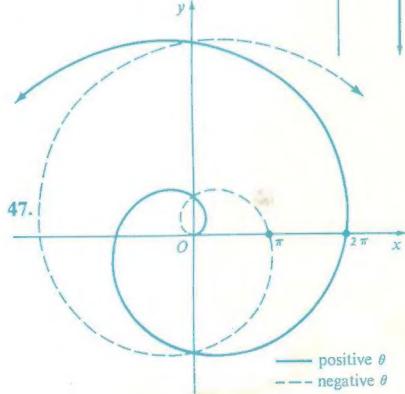
39.



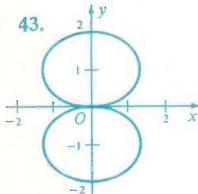
41.



47.



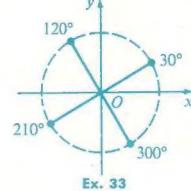
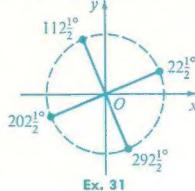
B 43.



45.



**Pages 590–591 A** 1.  $\cos 270^\circ + i \sin 270^\circ$     3.  $2(\cos 210^\circ + i \sin 210^\circ)$     5.  $2(\cos 120^\circ + i \sin 120^\circ)$   
 7.  $5(\cos 53^\circ 8' + i \sin 53^\circ 8')$     9.  $\sqrt{2} + \sqrt{2}i$     11.  $\frac{5\sqrt{2}}{2} - \frac{5\sqrt{2}}{2}i$     13.  $2 - 2\sqrt{3}i$     15.  $3.4872 + 1.9596i$   
 17. a.  $8(\cos 102^\circ + i \sin 102^\circ)$  b.  $2[\cos(-42^\circ) + i \sin(-42^\circ)]$     19. a.  $6\sqrt{2}(\cos 345^\circ + i \sin 345^\circ)$   
 b.  $\frac{\sqrt{2}}{3}(\cos 255^\circ + i \sin 255^\circ)$     21. 16    23.  $-\frac{\sqrt{3}}{128} - \frac{i}{128}$     25.  $2 - 2i$     27.  $-8 + 8\sqrt{3}i$   
 29.  $-0.0040 + 0.1011i$     31.  $\cos 22\frac{1}{2}^\circ + i \sin 22\frac{1}{2}^\circ$ ,  $\cos 112\frac{1}{2}^\circ + i \sin 112\frac{1}{2}^\circ$ ,  $\cos 202\frac{1}{2}^\circ + i \sin 202\frac{1}{2}^\circ$ ,  
 $\cos 292\frac{1}{2}^\circ + i \sin 292\frac{1}{2}^\circ$  (diagram below)    33.  $2(\cos 30^\circ + i \sin 30^\circ)$ ,  $2(\cos 120^\circ + i \sin 120^\circ)$ ,  
 $2(\cos 210^\circ + i \sin 210^\circ)$ ,  $2(\cos 300^\circ + i \sin 300^\circ)$  (diagram below)    **B** 37.  $\{\sqrt{2} + \sqrt{2}i, -\sqrt{2} + \sqrt{2}i, -\sqrt{2} - \sqrt{2}i, \sqrt{2} - \sqrt{2}i\}$     39.  $\{2\sqrt{6} + 2\sqrt{2}i, -2\sqrt{6} - 2\sqrt{2}i\}$



**Page 595 A** 1.  $\|u_x\| \doteq 8.7$ ;  $\|u_y\| = 5$     3.  $\|u_x\| = 7.5$ ;  $\|u_y\| \doteq 13.0$     5.  $\|u_x\| \doteq 4.2$ ;  $\|u_y\| \doteq 29.7$   
 7.  $\|u_x\| \doteq 8.8$ ;  $\|u_y\| \doteq 18.0$     9.  $\|u + v\| = 12.0$ ;  $m(\theta) = 30^\circ$     11.  $\|u + v\| = 10$ ;  $m(\theta) \doteq 53^\circ$   
 13.  $\|u + v\| \doteq 8.4$ ;  $m(\theta) \doteq 120^\circ$     15.  $\|u + v\| \doteq 19.0$ ;  $m(\theta) \doteq 89^\circ$

**Page 597 Chapter Test and Review** 1.  $\left\{y: y = \frac{\pi}{3} + 2k\pi\right\} \cup \left\{y: y = \frac{5\pi}{3} + 2k\pi\right\}$     3.  $\frac{1}{2}$     5.  $\{0^\circ, 180^\circ\}$   
 7.  $z_1 = 2\sqrt{2}(\cos 135^\circ + i \sin 135^\circ)$ ,  $z_2 = \sqrt{2}(\cos 135^\circ + i \sin 135^\circ)$ ;  $z_1 z_2 = 4(\cos 270^\circ + i \sin 270^\circ)$ ;  $\frac{z_1}{z_2} = 2(\cos 0^\circ + i \sin 0^\circ)$ ;  $z_1^4 = 64(\cos 180^\circ + i \sin 180^\circ)$     9.  $\|u_x\| \doteq 17.3$ ;  $\|u_y\| = 10$

**Page 601 A** 1.  $A \times B$  has 6 elements;  $A \cap B$  has 1 element;  $A \cup B$  has 4 elements.    3.  $A \times B$  has 6 elements;  $A \cap B$  has 2 elements;  $A \cup B$  has 3 elements.    5.  $A \times B$  has 9 elements;  $A \cap B$  has 3 elements;  $A \cup B$  has 3 elements.    7. 676    9. 1024    11. a. 58,500,000    b. 9,000,000    **B** 13. 80 (assuming at least one light is on.)    15. 625    **B** 17. 75

**Pages 604–605 A** 1. 5040    3. 30    5. 27,600    7. 120    9. 240    11. 288    13. 2240    15. 720    17. 12  
**C** 19. 2880    **B** 29. {7}

**Pages 606–607 A** 1. 6720    3. 420    5. 302,400    7. 4,989,600    9. 908,107,200    11. 10,080    13. 60  
**C** 15. 60    17. 10

**Pages 609–610 A** 1. 10; DR, DE, DA, DM, RE, RA, RM, EA, EM, AM    3. 10    5. 56    7. 10  
 9. 75,287,520    **B** 11. 20    13. 924    15. 2,604,000    17. 100

**Pages 611–612 A** 1. 810    3. 12    5. 350    **B** 7.  $5,598,661,068; 497,646,864$     9. 35,562,240    11. 2880  
**C** 13. 7200    15. 7200

**Page 614 A** 1.  $c^6 + 6c^5d + 15d^4c^2 + 20c^3d^3 + 15c^2d^4 + 6cd^5 + d^6$     3.  $m^7 - 7m^6t + 21m^5t^2 - 35m^4t^3 + 35m^3t^4 - 21m^2t^5 + 7mt^6 - t^7$     5.  $x^4 + 4x^3 + 6x^2 + 4x + 1$     7.  $x^4 + 8x^3 + 24x^2 + 32x + 16$     9.  $27x^3 - 27x^2 + 9x - 1$     11.  $r^{16} + 8r^{14}s^2 + 28r^{12}s^4 + 56r^{10}s^6 + 70r^8s^8 + 56r^6s^{10} + 28r^4s^{12} + 8r^2s^{14} + s^{16}$     13.  $a^6 + 3a^5x + \frac{15}{4}a^4x^2 + \frac{9}{2}a^3x^3 + \frac{15}{8}a^2x^4 + \frac{3}{16}ax^5 + \frac{1}{64}x^6$     15.  $6x^2m^2$     17.  $60x^4$   
 19.  $240d^2$

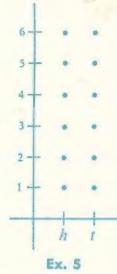
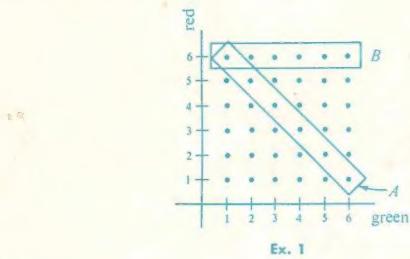
**Page 616 A** 1.  $1 + 12y + 54y^2 + 108y^3 + 81y^4$     3.  $64 + 96y + 60y^2 + 20y^3 + \frac{15}{4}y^4 + \frac{3}{8}y^5 + \frac{1}{64}y^6$   
 5.  $64 - 64y + \frac{80}{3}y^2 - \frac{160}{27}y^3 + \frac{29}{27}y^4 - \frac{4}{81}y^5 + \frac{1}{729}y^6$     **B** 7.  $210x^6y^4$     9.  $-1920b^3$

**Pages 618–619 A** 1. {1, 2, 3, 4, 5, 6, 7, 8, 9}; {2, 4, 6, 8}    3. {P, U, R, C, H, A, S, E}; {U, A, E}    5. {(1, 2), (1, 3), (1, 4), (2, 1), (2, 3), (2, 4), (3, 1), (3, 2), (3, 4), (4, 1), (4, 2), (4, 3)}; {(1, 3), (2, 4), (3, 1), (4, 2)}    7. {(L, E), (L, T), (L, R), (E, L), (E, T), (E, E), (E, R), (T, L), (T, E), (T, T), (T, R), (R, L), (R, E), (R, T)}; {(E, E), (T, T)}  
**B** 9. {(1, h), (1, t), (2, h), (2, t), (3, h), (3, t), (4, h), (4, t), (5, h), (5, t), (6, h), (6, t)}; {(1, h), (1, t), (3, h), (3, t), (5, h), (5, t)}

Pages 621–622 A 1.  $\frac{1}{5}; \frac{3}{10}; \frac{1}{2}; \frac{7}{10}$  3. 3 to 1 5. a.  $\frac{1}{3}$  b. 1 to 1 c. 3 to 1 7. a.  $\frac{2}{5}$  b.  $\frac{1}{5}$  c.  $\frac{1}{5}$  d. 1 (certainty) 9. a.  $\frac{1}{6}$  b.  $\frac{1}{3}$  c.  $\frac{1}{2}$  d.  $\frac{5}{6}$  e.  $\frac{2}{3}$  f. 0 11. a.  $\frac{11}{850}$  b.  $\frac{2}{17}$  c.  $\frac{703}{1700}$  d.  $\frac{1}{5525}$  B 13. 3,628,800;  $\frac{1}{945}$  15.  $\frac{2}{7}$

Page 624 A 1.  $\frac{1}{12}$  b.  $\frac{11}{36}$  c.  $\frac{7}{18}$  3. a.  $\frac{1}{7}$  b.  $\frac{1}{221}$  c.  $\frac{14}{221}$  5. a.  $\frac{25}{102}$  b.  $\frac{1}{221}$  c.  $\frac{55}{221}$  B 7.  $\frac{22}{35}$

Pages 626–628 A 1. a. b. (diagram below) 3. a.  $\{(h, t, t), (h, t, h), (h, h, t), (h, h, h), (t, h, h), (t, h, t), (t, t, h), (t, t, t)\}$  b.  $\frac{1}{2}$  c.  $\frac{7}{8}$  d. no 5. a. (diagram below) b.  $\frac{1}{4}$  c.  $\frac{1}{2}$  d. yes 7.  $\frac{1}{169}; \frac{1}{16}$  9.  $\frac{25}{169}; \frac{89}{169}$  B 11. a.  $\frac{7}{12}$  b.  $\frac{1}{3}$  c. no



Page 629 Chapter Test and Review 1. 6 3. 30,240 5. 4410 7.  $\frac{105}{8}r^{12}$  9. 7 to 5 11. a.  $\frac{25}{102}$  b.  $\frac{5}{221}$  c.  $\frac{5}{1326}$  d.  $\frac{167}{221}$

Page 638 A 1.  $x = 2; y = 1$  3.  $x = 2; y = 3$  5.  $x = 2; y = 6$  7.  $x = 7; y = 7$  9. [9 6] 11.  $\begin{bmatrix} 14 & 6 \\ -2 & 2 \end{bmatrix}$  13.  $\begin{bmatrix} 0 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 0 \end{bmatrix}$  15.  $[-3 \ 2]$  17.  $\begin{bmatrix} 2 & 4 \\ -4 & 2 \end{bmatrix}$  19.  $\begin{bmatrix} 2 & 4 & -2 \\ 6 & 1 & 8 \\ 4 & 2 & -12 \end{bmatrix}$  21.  $\begin{bmatrix} -1 & -1 \\ -6 & 0 \end{bmatrix}$  23.  $\begin{bmatrix} 0 & 2 \\ 12 & 10 \end{bmatrix}$

Page 641 A 1.  $\begin{bmatrix} 3 & -3 \\ 6 & 9 \end{bmatrix}$  3.  $\begin{bmatrix} 8 & -4 \\ -4 & -16 \end{bmatrix}$  5.  $\begin{bmatrix} 0 & -1 \\ 5 & 10 \end{bmatrix}$  7.  $\begin{bmatrix} -1 & -1 \\ 8 & 17 \end{bmatrix}$  9.  $\begin{bmatrix} 4 & -3 \\ 3 & 2 \end{bmatrix}$  11.  $\begin{bmatrix} 7 & -5 \\ 4 & 1 \end{bmatrix}$  B 13.  $\begin{bmatrix} 0 & 5 \\ -3 & 1 \end{bmatrix}$  15.  $\begin{bmatrix} \frac{1}{2} & \frac{3}{2} \\ -1 & \frac{1}{2} \end{bmatrix}$  17.  $\begin{bmatrix} -\frac{1}{3} & 1 \\ -\frac{1}{3} & -\frac{1}{3} \end{bmatrix}$

Page 645 A 1.  $\begin{bmatrix} 2 & -1 \\ -1 & 3 \end{bmatrix}$  3.  $\begin{bmatrix} -1 & 7 \\ 3 & 4 \end{bmatrix}$  5.  $\begin{bmatrix} -4 & 3 \\ 3 & -1 \end{bmatrix}$  7.  $\begin{bmatrix} 7 & 6 \\ 4 & 7 \end{bmatrix}$  9.  $\begin{bmatrix} -5 & 10 \\ 6 & 3 \end{bmatrix}$  11.  $\begin{bmatrix} 15 & 0 \\ 0 & 15 \end{bmatrix}$  13. no 15. yes B 17. yes 19.  $\begin{bmatrix} -4 & 3 \\ -11 & 14 \end{bmatrix}$  21. [10]

Page 648 A 1. yes 3. yes 5. no 7. no 9. yes 11. yes 13. yes 15. yes B 17. no 19. no

Pages 652–653 A 1. 1 3. 10 5. 0 7. 0 9.  $-\frac{7}{25}$  11.  $a^2 - b^2$  13. 67 15. 53 17. 67 19. 53 21. {1} 23. {4} B 25. {2, -3} 27. -15

Pages 656–657 A 1.  $\begin{bmatrix} -1 & -3 \\ -1 & -2 \end{bmatrix}$  3.  $\begin{bmatrix} -5 & -3 \\ -2 & -1 \end{bmatrix}$  5.  $\begin{bmatrix} \frac{1}{4} & \frac{1}{16} \\ -\frac{1}{2} & \frac{1}{8} \end{bmatrix}$  7.  $\begin{bmatrix} \frac{2}{9} & -\frac{1}{3} \\ -\frac{1}{9} & -\frac{2}{9} \end{bmatrix}$  9.  $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$  11.  $\begin{bmatrix} \frac{9}{22} & \frac{11}{11} \\ -\frac{9}{22} & \frac{2}{11} \end{bmatrix}$  B 13.  $\begin{bmatrix} 1 & -6 \\ -1 & 7 \end{bmatrix}$  15.  $\begin{bmatrix} 4 & 5 \\ -3 & -\frac{9}{2} \end{bmatrix}$  17.  $\begin{bmatrix} -5 & 10 \\ 4 & -7 \end{bmatrix}$

Page 661 A 1.  $\{(1, -2)\}$  3.  $\{(-2, 1)\}$  5.  $\{(3, 0)\}$  7. dependent equations 9.  $\{(1, -2)\}$  11.  $\{(-2, 1)\}$  13.  $\{(3, 0)\}$  15. dependent equations B 17.  $\{(1, 1, 2)\}$  19.  $\{(2, 3, 1)\}$  21. dependent equations

Page 663 Chapter Test and Review 1.  $\begin{bmatrix} 2 & 3 \\ 5 & -8 \end{bmatrix}$  3.  $\begin{bmatrix} -2 & 3 \\ 3 & 3 \end{bmatrix}$  5. -13 7.  $\begin{bmatrix} -1 & -1 \\ -2 & -3 \end{bmatrix}$  9.  $\{(1, -2)\}$

Page 665 1. -420 3. -24 5. -54